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ENTEROPATHOGENIC VIRUSES AND BACTERIA

ROLE IN SUMMER DIARRHEAL DISEASES OF INFANCY AND EARLY CHILDHOOD

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A test group of 153 children with summer diarrhea were compared with a matched contratest group of 100 children without diarrhea as to the results of bacteriological and virological examination of rectal swabs. In addition, acute and convalescent phase serums were obtained from many of the patients. The number of enteroviruses recovered from the rectal swabs of the test group was 2.5 times the number recovered from the contratest group. Viruses of the ECHO group were recovered six times more often from the children with diarrhea, and it is only to these viruses that a statistically significant etiological role could be assigned. Other important data as to the etiological significance and interrelations of enteropathogenic viruses and bacteria were obtained. It appeared that summer diarrhea of very young children is not an entity but rather a consequence of transitory infections with a large variety of bacterial and viral pathogens.

ALTHOUGH bacteria belonging to the Shigella, Salmonella, and pathogenic Escherichia coli groups are known to be etiologically associated with diarrheal diseases that become especially prevalent among infants and young children during the summer season in temperate zones, it is also known that these enteropathogenic bacteria are frequently absent in the vast majority of such patients. The available data on the etiology of infectious diarrheal diseases were summarized recently by Hodes [1] and Higgins.[2] Although evidence for the etiological role of certain filtrable agents has been adduced by studies on human volunteers (summarized by Gordon [3]), the role of the large number of viruses recovered in recent years from the human intestinal tract either by inoculation of newborn mice (the Coxsackie group predominantly) or by tissue cultures has as yet received little attention.

At least 46 distinct viruses, including 3 types of poliovirus, 19 types of Coxsackie A, 5 types of Coxsackie B, and 19 types of ECHO (enteric cytopathogenic human orphan viruses) recently grouped together as enteroviruses,[4] are already known to be multiplying at various times in the human intestinal tract, and a considerable number

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of new candidates are awaiting their turn for admission into this rapidly expanding group of human viruses. Although Travassos and associates [5] recovered Coxsackie A viruses from 9 of 20 infants with gastroenteritis in Brazil, Pohjanpelto [6] found Coxsackie viruses, mainly A 4, in only 4.4% of a group of 187 patients with diarrhea in Finland, and Parrott [7] recovered only four Coxsackie strains (all group A) from 165 children with undiagnosed miscellaneous diarrheal diseases in the United States.

After a study of the incidence and characteristics of the ECHO viruses among healthy children in Cincinnati [8] and Mexico,[9] we undertook an investigation of the role of the ECHO and other enteroviruses in the summer diarrheas of infants and children in Cincinnati. The orienting studies on the material collected from 56 children with diarrhea during the summer of 1955 indicated that enteroviruses of many different types could be recovered in monkey kidney tissue cultures from 50% of the patients.[10] The fact that such viruses were recovered from only 6% of 154 children, aged one to four years, without diarrhea in Cincinnati in 1953, and that serologic tests on many of the children with diarrhea indicated that the viral infections and the clinical manifestations had their onset at about the same time, strongly suggested an etiological association between the two events.

It was realized, however, that the results obtained on healthy children in one year did not provide a suitable control for the results obtained on children with diarrhea in another year. Accordingly we repeated this study in 1956 and extended our observations to include simultaneous tests on a control group without diarrhea matched for age, socioeconomic status, and time of sampling. We also tested both groups for enteropathogenic bacteria and for Coxsackie A viruses by inoculation of newborn mice. The final results obtained on 153 children under four years of age with diarrhea in 1955 and 1956 and on 100 children of similar age without diarrhea form the basis of the present communication.

Procedure and Methods of Study

The children selected for this study were all seen in the clinics or wards of the General and Children's hospitals of Cincinnati during the summers of 1955 and 1956. Approximataly 75% were under one year of age, and the remainder were under four years of age. They generally belonged to the lower-income group and were residents of Cincinnati. The "diarrhea" group was made up of children who were brought to the hospitals because of sudden onset of diarrhea, frequently but not always associated with fever, vomiting, and dehydration. The 1956 control group "without diarrhea" was made up of children who were brought to the same clinics for routine examinations or reasons other than acute illness, and were selected, matched for age and numbers, as far as possible on the same days that children with diarrhea were admitted to the study.

Although the children in the control group had no history of diarrhea during the preceding month, there were unfortunately no provisions for follow-up regarding the development of diarrhea or other acute illness during the week or two after rectal swabs were obtained from them. Accordingly "without diarrhea" has reference only to the condition at the time of sampling and does not exclude the possibility that at least some of the children in this group may have developed this syndrome subsequently.

Although stool specimens would naturally be expected to yield a higher incidence of virus isolations, it was more expedient to limit the study to rectal swabs. The specimens were obtained as soon as possible after onset, on the first visit to the clinic or shortly after admission to the hospital, not only to increase the chances of virus recovery but also to eliminate the possibility of picking up viruses or bacteria transmitted in the hospital subsequent to admission. A sterile cotton swab was moistened in Hanks' balanced salt solution, passed through the anal orifice, turned around and removed. In the 1955 tests, the Hanks' solution contained 100 units of penicillin and 0.1 mg. of streptomycin, and only a single swab was obtained from each patient and put into 2 ml. of the solution.

In an attempt to increase the chances of virus recovery, two swabs were obtained from each child in 1956 and both were put into a single tube containing 4 ml. of Hanks' solution without antibiotics because an aliquot of the same solution was to be used for isolation of enteropathogenic bacteria. The tubes containing the contaminated swabs and solution were stored in a deep freeze at about —20 C. On the day of test the specimens were thawed, the swabs were drained against the sides of the tube and discarded, and to the portions used for virus isolation enough penicillin and streptomycin were added to yield concentrations of 2,000 units and 2 mg. per milliliter respectively. In 1956 we also added enough mystatin (Mycostatin) to yield 150 units per milliliter. When the extracts of the swabs were acid, two or three drops of a 4.4% solution of sodium bicarbonate were added to bring the pH to about 8. After storage for 30 minutes in the refrigerator, the extracts were used without centrifugation.

Isolation and Identification of Cytopathogenic Viruses

Trypsinized cynomolgus monkey kidney cells grown in stationary roller tubes were the only tissue cultures used. The outgrowth medium consisted of 0.5% lactalbumin hydrolysate in Hanks' solution and 2% heated calf serum, and 0.5 ml. of a 1:200 suspension of trypsinized cells was distrib-

uted in each tube. In 1955, the medium was neither removed nor changed, and after the cells had formed a confluent sheet in six to seven days, 1.5 ml. of maintenance medium (0.5% lactalbumin hydrolysate in Earle's solution) was added and the tubes were ready for use. In 1956, the outgrowth of cells was enriched by adding more growth medium after four days, and before use the serum-containing medium was removed and replaced by the maintenance medium without serum. Each specimen was inoculated into three or four tubes (0.2 ml. per tube).

In order to increase the comparability of the tests on the diarrhea and control groups, a similar number of specimens from the control group were inoculated into tissue culture tubes of the same lot of monkey kidney cells as were used for the specimens from the diarrhea group. The inoculated culture tubes were kept in roller drums in an incubator at 36 to 37 C. The tubes were observed microscopically daily or every other day for two weeks for evidence of cytopathogenic change. No blind passages were carried out, and only the tubes that exhibited definite or suspected specific cytopathogenic changes were harvested for passage into a new series of tubes to establish the transmissibility of the cytopathogenic agent and to provide culture fluid for serologic identification.

Each cytopathogenic agent was first titrated in tissue culture in order to avoid the misleading results that may be obtained when amounts of virus significantly greater or smaller than 100 TCD_{50} (tissue culture infective doses) are used for serologic identification. The antiserums used to identify these agents were either prepared and standardized by ourselves or supplied by others. The poliovirus and some of the ECHO antiserums were those prepared by Wenner and co-workers [11] and checked by the committee on enteroviruses of The National Foundation for Infantile Paralysis,[4] and some of the Coxsackie antiserums were supplied by Drs. J. L. Melnick and J. T. Syverton. The preliminary identification was carried out with pools of poliovirus, ECHO, and Coxsackie antiserums [4] except for the ECHO 4 and 14, and the Coxsackie B 5 antiserums which were used individually because of their low potency. When an agent was neutralized by a given pool, it was finally typed by neutralization tests with the individual antiserums. Antiserums for Coxsackie types A 7, A 9, and A 14 were also used but the only Coxsackie A viruses recovered in the monkey kidney tissue cultures were type A 9.

All cytopathogenic agents which failed to be neutralized by the available serums were tested in newborn mice. The unclassified strains, which failed to produce apparent disease in newborn mice, were used for the preparation of antiserums. With the exception of three unclassified cytopathogenic and newborn mouse pathogenic strains, all but five of the viruses recovered in 1955 could be classified. The antiserums prepared against these five strains indicated that two were antigenically broader relatives of ECHO 6, one an antigenically broader relative of ECHO 10, and the remaining two became the prototypes of the ECHO 18 and ECHO 19 viruses.[12] These antiserums, as well as the antiserums for the new ECHO types 15, 16, and 17, were also used for the identification of the strains recovered in 1956. Although monkey kidney tissue cultures are not the medium of choice for the recovery of adenoviruses, four strains belonging to this group were isolated from the rectal swabs obtained from children with diarrhea; the distinctive cytopathogenic changes first suggested the presence of adenoviruses. Drs. Wallace Rowe and Isaac Ruchman did the serologic identifications and typing. It is noteworthy that 45 of the 54 cytopathogenic agents isolated in 1956 could be classified with the available serums.

TABLE 1.—*Isolation of Viruses and Pathogenic Bacteria from Rectal Swabs of Children With or Without Diarrhea During Summer of 1955 and 1956 in Cincinnati*

		Virus Isolations					Bacteria Isolations			
		Monkey Kidney Cultures		Newborn Mice		Virus Positive				No. Patients with Pathogenic Esch. Coli Yielding Virus
Group	Yr.	No. Tested	No. Positive	No. Tested	No. Positive	Total	No. Tested	Shigella or Salmonella	Pathogenic Esch. Coli	
Diarrhea	1955	56	24 (43%)	32*	4 (12.5%)	28 (50%)	41	5 (12%)		
							15		3 (20%)	2/3 (67%)
	1956	97	41 (42%)	56*	6 (10%)	47 (48%)	86	6 (7%)	26 (30%)	13/26 (50%)
No diarrhea	1956	100	13 (13%)	87*	7† (8%)	20 (20%)	64	0	13 (20%)	2/13 (23%)

* These specimens failed to yield a virus in monkey kidney tissue culture.
† One of these strains, after passage in mice, proved to be cytopathogenic in monkey kidney tissue culture and was identified as Coxsackie B 4.

Tests for Noncytopathogenic Coxsackie A Viruses

All rectal swab extracts that failed to yield a cytopathogenic agent were inoculated in Swiss albino newborn mice less than 24 hours old—0.02 ml. intracerebrally and 0.1 ml. subcutaneously for each mouse. The animals were observed for 21 days, and those found dead or with suggestive signs of infection two or more days after inoculation were used for the preparation of a suspension for further tests. A 20% suspension of the carcass and viscera

was passed to another litter of newborn mice and also inoculated in four tubes of monkey kidney tissue culture. Only one of the 17 strains of virus recovered in newborn mice from the tissue culture negative specimens proved to be cytopathogenic for monkey kidney tissue culture after passage in mice, and by histological and serologic examinations it proved to be a Coxsackie B 4; the other 16

TABLE 2.—*Influence of Age of Children in Diarrhea and Control Groups on Recovery of Viruses from Rectal Swabs (Cincinnati, 1956)*

	Diarrhea			No Diarrhea		
	No.	Positive*		No.	Positive*	
Age Group, Yr	Tested	No.	%	Tested	No.	%
<1	71	34	48	75	12	16
1 to 3	26	13	50	25	8	32
Total	97	47	48	100	20	20

* Positive by test in monkey kidney tissue culture and in mice.

strains produced only the muscle lesions that are associated with infections by Coxsackie A viruses. Herpes viruses would have been cytopathogenic after passage in mice and would also have produced different lesions in the animals. Accordingly these noncytopathogenic, newborn mouse pathogenic strains were classified as Coxsackie A viruses.

Serologic and Bacteriological Studies on Patients

Acute and convalescent phase serums obtained from many but not all of the patients were used for two purposes: (1) to establish a rising antibody titer against the virus recovered from the patient which would indicate that the disease and the infection with the virus had their onset at about the same time, and (2) to determine the occurrence of infection among patients from whom no virus was recovered in the small amount of material obtained on the rectal swabs. Neutralization tests using tenfold dilutions of serums and 100 TCD_{50} of virus were carried out in tissue culture tubes, the endpoint being determined by the presence or absence of a cytopathogenic effect. The recorded titers represent the 50% serum dilution endpoints based on the readings six to eight days after inoculation; in some instances these titers were higher in the earlier readings because the effect of antibody manifests itself by a retardation as well as by complete inhibition of the cytopathogenic effect. The methods used for the isolation and identification of bacteria from the rectal swab extracts were those described by Edwards and Ewing.[13]

Results

The data shown in table 1 indicate that the number of enteroviruses recovered from the rectal swabs of the children with diarrhea was remarkably similar in 1955 and 1956, i.e., 50% and 48%, respectively, while in the control group of 1956 it was only 20%—a 2.5-fold difference. When one separates the enteroviruses into the noncytopathogenic, newborn-mouse-pathogenic group (Coxsackie A), and the cytopathogenic group, one finds a threefold higher incidence of the latter among the children with diarrhea and no difference in the incidence of the former. The incidence of Shigella and Salmonella organisms combined was only 7% in the 1956 diarrhea group while none were recovered from the control group. On the other hand, the incidence of pathogenic Esch. coli was approximately the same in both groups, although it will be shown later that at least one of the serotypes occurred much more frequently in the diarrhea group.

The data shown in table 2 indicate that in the diarrhea group the incidence of all enteroviruses was about the same in the infants under one year of age as in the one to three-year-old children, while in the control group the incidence of these viruses was twice as high in the older children than in the infants under one year of age. It should also be noted that the numbers of children in each age group are approximately the same in both groups, and that among the 97 randomly selected children with diarrhea 73% of the cases occurred in infants under one year of age.

The data shown in table 3 indicate not only that the diarrheal diseases became more prevalent as summer progressed but also that the incidence of virus recovery also progressively increased from 20% in June, to 35% in July, and 59% in August.

The data shown in table 4 indicate that the 65 cytopathogenic viruses recovered in 1955 and 1956 from the children with diarrhea included not only polioviruses and Coxsackie and ECHO viruses but also a small number of adenoviruses and some cytopathogenic, newborn-mouse-pathogenic viruses still to be identified. The adenoviruses and unidentified viruses just mentioned were not recovered from the control group. The incidence of the polioviruses

TABLE 3.—*Recovery of Viruses from Rectal Swabs of Children in Diarrhea and Control Groups During Different Months of Summer of 1956 in Cincinnati*

	Diarrhea			No Diarrhea		
	No.	Positive		No.	Positive	
Month	Tested	No.	%	Tested	No.	%
June	5	1	20	6	0	0
July	34	12	35	33	6	18
Aug.	58	34	59	61	14	23
Total	97	47	48	100	20	20

and of the Coxsackie viruses was about the same in the control and diarrhea groups. On the other hand, the incidence of the ECHO viruses was six times higher in the 1956 group with diarrhea than in those without diarrhea. Furthermore, certain ECHO viruses, e.g., the five strains of ECHO 6 and the seven unclassified strains, were not encountered at all among the 100 children without diarrhea. The following types were encountered among the 42 ECHO strains recovered from the children

with diarrhea in 1955 and 1956: II, 1; VI, 7; VII, 11; VIII, 3; X, 1; XI, 2; XII, 3; XIV, 5; XVIII, 1; XIX, 1; and unclassified, 7. Subsequent work by Dr. R. Wigand in this laboratory indicated that six of the seven unclassified strains form three new, antigenically distinct types of ECHO virus. Thus representatives of 13 distinct antigenic types of ECHO virus were associated with diarrheal disease in children during the summers of 1955 and 1956 in Cincinnati.

In a preliminary report [10] on the viruses recovered from the children with diarrhea in 1955, it was pointed out that six strains that could not be identified with available antiserums belonged to five serologically distinct types designated D 1 to D 5. Subsequent work on the D 1 virus, of which there were two strains, showed that it was a "prime" variant of ECHO 6 (see table 5). The similar titers with the original as well as with the purified viruses. Similar as well as other patterns of antigenic variation within the ECHO 6 group have also been reported by Melnick [14] and Karzon [15] among strains recovered from patients with the aseptic meningitis syndrome.

The D 2 virus culture fluid was originally not neutralized by any of the available ECHO or cytopathogenic Coxsackie antiserums and was not pathogenic for newborn mice. However, when antiserums were prepared against both the unpurified and plaque-purified progeny of this virus in the course of studying it as a potentially new type of ECHO virus, it was found that the antiserums neutralized Coxsackie B 3 virus as well as the one being studied. Furthermore, it was subsequently possible to adapt the virus to newborn mice. This finding established two significant points: (1) that

TABLE 4.—*Incidence of Different Viruses Among Cytopathogenic Agents Isolated from Rectal Swabs of Children With and Without Diarrhea*

	1955				1956							
	Diarrhea (56 Children)				Diarrhea (97 Children)				No Diarrhea (100 Children)			
	Strains, Total No.				Total Strains				Total Strains			
Virus Recovered	No.	%	Serologic Type	Strains, No.	No.	%	Serologic Type	Strains, No.	No.	%	Serologic Type	Strains, No.
Poliomyelitis	3	5	I	3	3	3	III	3	3	3	II	1
											III	2
Coxsackie	5	9	A 9	1	4	4	A 9	0	6	6	A 9	0
			B 2	2			B 2	0			B 2	0
			B 3	1			B 3	1			B 3	3
			B 4	1			B 4	1			B 4	2
			B 5	0			B 5	2			B 5	1
Unclassified mouse pathogenic*	3	5			1	1			0	0		
Adenoviruses	1	2	III	1	3	3	I	1				
							II	1	0	0		
							III	0				
							Not I to X	1				
ECHO	12	21	2	1	30	31	2	0	5	5	2	1
			8	1			6	5			6	0
			11	2			7	11			7	3
			12	3			8	2			8	0
	New types						14	5			14	1
	D-1 variant of ECHO 6			2								
	D-3 ECHO 18			1			Unclassified	7			Unclassified	0
	D-4 ECHO 19			1								
	D-5 variant of ECHO 10			1								

* Tissue cultures pathogenic for newborn mice—not neutralized by antiserums for Coxsackie A 7, A 9, A 14, B 1 to B 5, or any of the ECHO antiserums.

prototype ECHO 6 antiserum with a homotypic titer of 1:500, originally used for the identification of the two D 1 strains, failed to neutralize them in a dilution of 1:10. More potent ECHO 6 antiserums used subsequently yielded titers that were 100 times lower against D 1 than against the prototype virus. On the other hand, an antiserum prepared against the D 1 virus yielded approximately similar titers against the prototype ECHO 6 virus as against itself. It is also noteworthy that one of the children from whom a D 1 strain was recovered developed antibody equally well for the prototype ECHO 6 and the homologous D 1 strain (table 5). That the D 1 virus actually represents an antigenically more complex member of the ECHO 6 group rather than a mixture of two viruses was indicated by tests with an antiserum prepared with D 1 progeny derived from two terminal dilution passages. This procedure had to be used because the virus did not produce plaques; this antiserum gave there are "prime" antigenic variants of Coxsackie B viruses, and (2) that some naturally occurring Coxsackie B 3 viruses may have such a limited pathogenicity for newborn mice even after passage in monkey kidney tissue culture that they behave like ECHO viruses.

The D 3 and D 4 viruses, after rigorous analysis, were established as new types—18 and 19, respectively—in the ECHO group.[4] The importance of establishing new types even when only a single strain has been isolated is exemplified by ECHO 18, which turned up as the sole cause of an epidemic in premature and full-term babies in New York in 1956.[16]

The D 5 virus produced a distinctive cytopathogenic effect, similar to that of ECHO 10, but it was not neutralized by the ECHO 10 antiserum originally available for its identification. Furthermore, an antiserum prepared against the D 5 virus failed to neutralize the ECHO 10 virus. Nevertheless, a

highly potent ECHO 10 antiserum was found to neutralize the D 5 virus, although in a one-hundred-fold lower titer. Accordingly it was decided that this virus belonged in the ECHO 10 group, which has already been found to be antigenically heterogeneous. Evidence that the patient, and not the monkey kidney tissue culture, was the source of this virus and that the infection was concurrent with the disease was adduced by demonstration of a tenfold increase in antibody in the convalescent phase serum (see table 6).

TABLE 5.—*Antigenic Relationship Between D 1 and ECHO 6 Viruses*

Antiserum	Serum Dilution Endpoint per 0.1 Ml. vs. Indicated Virus: ECHO 6 (D'Amori) TCD50	ECHO 6 (D'Amori) Titer	D 1* TCD50	D 1* Titer
ECHO 6 (D'Amori)				
Melnick's monkey serum	100	500	32	<10
Wenner's monkey serum	64	16,000	320	160
ECHO 6 (D'Amori) Cincinnati rabbit serum				
Before immunization	100	0	20	0
After immunization	100	1,600	20	16
D 1* Cincinnati rabbit serum				
Before immunization	32	<5	32	<5
After immunization	32	160	32	100
D 1* patient				
1 day after onset of disease	20	10	32	<5
10 days after onset of disease	20	100	32	16

* Case 12 (table 7).

If the children were mere carriers of these viruses while the diarrheal illness had some other etiology, one would expect in many instances to find almost maximum levels of antibody for the recovered viruses at the onset of the disease. Table 7 presents the results of tests for antibody on the acute and convalescent phase serums of 24 infants with diarrhea against the various enteroviruses that were recovered from them shortly after onset of illness. It is noteworthy that in each case there was little or no demonstrable antibody in the acute phase serum while antibody of varying levels, some low and some high, appeared during convalescence. It is furthermore noteworthy that this is true not only of the ECHO viruses, which were isolated with very much higher frequency from the diarrhea than from the control group, but also for the cytopathogenic Coxsackie and polioviruses which occurred with equal frequency in both groups.

To obtain some idea of the number of acute infections that may have been missed by using only rectal swabs for isolation of virus, acute and convalescent phase serums from 35 children with diarrhea whose rectal swabs yielded no virus were tested against only a few of the enteroviruses that were recovered in 1955 and 1956. The results shown in table 8 indicate that in seven of these patients (20%) there was evidence of concurrent acute infection, and it is not improbable that a much higher percentage would have been positive if a much larger number of the enteroviruses and also adenoviruses had been used for such tests. This means that the total incidence of infection with enteroviruses and perhaps also adenoviruses was considerably greater than indicated by recovery of virus from the rectal swabs.

Although the incidence of all enteropathogenic Esch. coli was not significantly different in the two groups, the data presented in table 9 indicate that type 0.111 B 4 was six times more frequent in the children with diarrhea and constituted about 62% of the 26 strains recovered from this group. Furthermore, 6 of the 13 strains recovered from the children without diarrhea belonged to types 0.125 B 15 and 0.119 B 14 which were not recovered at all from the children with diarrhea. Thus, the analysis of the results by individual serotypes indicates a more significant association of some of the enteropathogenic Esch. coli, especially 0.111 B 4, with diarrhea than was suggested by the undifferentiated data. The frequent association of 0.111 B 4 and 0.55 B 5 with infantile diarrhea has been reported by others.[17] Organisms belonging to the Shigella and Salmonella groups were not recovered from the children without diarrhea. Among the 11 strains recovered from children with diarrhea in 1955 and 1956, there were five Sh. flexneri, one Sh. sonnei, three Sal. paratyphi B, and two Sal. paratyphi C.

The data presented in table 10 indicate that (*a*) viruses as the sole agents were more frequently recovered from children with diarrhea (34% in 1955 and 35% in 1956) than were enteropathogenic bacteria without viruses; (*b*) while the incidence of pathogenic Esch. coli without viruses was the same in the diarrhea and control groups, double infections with viruses and Esch. coli were three times more frequent in the diarrhea group (15%) than in the control group (5%); (*c*) while the enteroviruses in the double infections with Esch. coli were all of the cytopathogenic variety (predominantly ECHO), the viruses found in conjunction with Esch. coli in the control group were all noncytopathogenic Coxsackie A viruses; and (*d*) the few children with diarrhea who yielded Shi-

TABLE 6.—*Antigenic Relationship Between D 5 and ECHO 10 Viruses*

Antiserum	Serum Dilution Endpoint per 0.1 Ml. vs. Indicated Virus: ECHO 10 (Lang) TCD50	ECHO 10 (Lang) Titer	D 5* TCD50	D 5* Titer
ECHO 10 (Lang) Cincinnati rabbit serum				
Before immunization	100	10	320	<5
After immunization	100	1,000	320	<5
Wenner's monkey serum	160	16,000	32	160
D 5* rabbit serum				
Before immunization	160	<5	32	<5
After immunization	160	<5	32	500
D 5* patient				
3 days after onset of disease			320	16
25 days after onset of disease			320	160

* Case 19 (table 7).

gella and Salmonella organisms had no associated viruses in 1956, while the double infections in 1955 again involved only cytopathogenic enteroviruses.

The enteroviruses associated with the two most prevalent types of enteropathogenic bacteria (0.111 B 4 and 0.55 B 5) are shown in table 11.

None of 153 children with diarrhea died. The incidence of various clinical manifestations observed among 66 children from whom viruses or enteropathogenic bacteria or both were recovered, summarized in table 12, indicates that (*a*) severe illness was least frequent among the children from whom only viruses were recovered, although 53% of this group were sufficiently ill to require hospitalization; (*b*) severe illness, with special reference to the extent of dehydration, was most frequent among the children infected with enteropathogenic Esch. coli—alone or in combination with viruses—and it is perhaps noteworthy that none of these had blood in their stools; and (*c*) blood in the stools occurred as often (20%) among those

TABLE 7.—*Neutralizing Antibodies in Acute and Convalescent Phase Serums of Children with Diarrhea Against Viruses Recovered from Their Own Rectal Swabs*

Yr.	Case No.	Age, Mo.	Virus Recovered	Days After Onset Serum Obtained		Antibody Titer 0.1 Ml.	
				Acute	Convl.	Acute	Convl.
1955	1	9	Poliomyelitis 1	3	24	<5	160
	2	8	Poliomyelitis 1	?*	40†	<5	160
	3	17	Poliomyelitis 1	8	35	<5	160
	4	4	Coxsackie A 9	1	20	<5	160+
	5	19	Coxsackie B 4	3	39	<5	160+
	6	1	Coxsackie B 2	4	28	<5	160+
	7	8	Cytopathogenic, mouse pathogenic, mixture Coxsackie B3+ECHO	6	27	<5	16
	8	36	Cytopathogenic, mouse pathogenic, mixture Coxsackie A 9 + poliomyelitis 1	2	30	0	2
	9	3	ECHO 2	2	24	0	4
	10	1	ECHO 8	1	19	0	5
	11	5	ECHO 11	4	20	<5	16
	12	7	ECHO 12	9	38	<5	50
	13	3	ECHO 12	4	26	<5	160+
	14	3	ECHO 12	3	33	<5	160+
	15	2	D 1 antigenic variant of ECHO 6	1	18	<5	16
	16	9	D 1 antigenic variant of ECHO 6	6	29	<5	50
	17	8	D 3 ECHO 18	0	21	0	5
	18	2	D 4 ECHO 19	2	20	0	2
	19	30	D 5 antigenic variant of ECHO 10	3	25	16	160
1956	20	4	ECHO 6	?*	21†	0	4
	21	2	ECHO 6	1	25	<5	50
	22	9	ECHO 7	1	12	<5	5
	23	1	Coxsackie B 5	1	21	5	50
	24	2	Coxsackie B 4	1	15	0	4

* Day of onset of disease not established.
† Number of days after obtaining acute phase serum specimen.

from whom only viruses were recovered as among those from whom only Shigella or Salmonella organisms were recovered (17%).

Comment

The results presented in this communication raise the question of the etiological significance of the various viruses that have been recovered from infants and children with summer diarrheal diseases. On the basis of the comparative frequency of isolation from children with diarrhea and from the control group without diarrhea at the time of sampling, a significant etiological role may be assigned only to the viruses of the ECHO group, which were recovered six times more often from the children with diarrhea.

TABLE 8.—*Serologic Studies on Patients with Diarrhea from Whom No Virus Was Recovered*

Yr.	Patients Tested, No.	Virus Used in Neutralization Test	No. Patients Developing Significant Rise in Neutralizing Antibody During Convalescence	Total	
				No.	%
1955	18	Poliomyelitis 1	1		
		Coxsackie A 9	1		
		ECHO 12	1	3	16.6
		D 4, ECHO 19	0		
		D 5 variant of ECHO 10	0		
1956	17	Poliomyelitis 3	0		
		ECHO 6	0		
		ECHO 7	4	4	23.5
		ECHO 8	0		
		ECHO 14	0		

Although the polioviruses and cytopathogenic Coxsackie viruses were recovered with the same frequency in both groups, one cannot say that they were not responsible for the illness observed in the children from whom they were isolated for the following reasons: (*a*) all of these viruses are already known to produce a spectrum of clinical manifestations ranging from minor illnesses, of which diarrhea may be an occasional manifestation, especially in infants, to more severe disease with varying degrees of involvement of the central nervous system, as well as completely inapparent infections; (*b*) the diarrheal illness was shown to be concurrent with an acute infection of these viruses as was shown by the development of neutralizing antibodies during convalescence; and (*c*) although some of the children in the control group from whom these viruses were recovered may indeed have had only an inapparent infection, it is possible that others might have had some illness with or without diarrhea subsequent to the time of sampling.

The same considerations may apply to the noncytopathogenic Coxsackie A viruses which were found with a similar low frequency in both groups, since Coxsackie A viruses have already been established as the cause of some summer febrile illnesses including the syndrome of herpangina, and here again it is possible that when such infections occur in very young infants that diarrhea and vomiting may become the predominant clinical manifestations. Some of the adenoviruses also seem to have a predilection for spreading during the summer months with the production of the syndrome, designated as pharyngoconjunctival fever, in which conjunctivitis may not however always be present while abdominal pain, vomiting, and diarrhea may

not infrequently become prominent clinical manifestations.[18] It is of interest, therefore, that in both 1955 and 1956 the rectal swabs from children with diarrhea, but not from those in the control group, yielded a small number of adenoviruses when cultured on a medium that is least suitable for the isolation of these viruses; had we used HeLa cells and serologic tests for detection of infection with

TABLE 9.—*Incidence of Various Types of Pathogenic Esch. Coli Among 26 Strains Recovered from Children With Diarrhea and 13 Strains Recovered from Children Without Diarrhea, Cincinnati, Summer of 1956*

	No. strains and % Incidence in Indicated Group			
	Diarrhea, 86 Tested		No Diarrhea, 64 Tested	
Serologic Type	No.	%	No.	%
0.111 B 4	16	19	2	3
0.55 B 5	5	6	2	3
0.26 B 6	1	1	2	3
0.127 B 8	1	1	1	1
0.125 B 5	1	1	0	
0.86 B 7	1	1	0	
0.126 B 6	1	1	0	
0.125 B 15	0		4	6
0.119 B 14	0		2	3
Total	26	30	13	20

these viruses, it is not improbable that adenoviruses might have accounted for a larger proportion of the viral infections.

Although the ECHO viruses, as a group, were more frequently associated with diarrheal disease than any of the other groups of viruses or bacteria, 13 different types were represented among the 42 strains that were recovered from the children with diarrhea. Although ECHO types 6, 7, and 14 were encountered more frequently (23 of 42) than the other 10 types (18 of 42), this may only reflect the fact that these viruses were being more extensively disseminated than the others during the years of our study in Cincinnati. That one cannot dismiss as insignificant a type of ECHO virus that may have been recovered only once from the children with diarrhea is emphasized by observations on ECHO type 18. It was recovered as an unclassified virus from an 8-month-old baby with diarrhea in the 1955 study, and remained the only strain of its type among all ECHO viruses recovered in our study. However, an outbreak of diarrhea among premature and full-term infants at the New York Hospital–Cornell University Medical Center during the summer of 1956 was shown by Eichenwald and associates[16] to have been caused solely by ECHO type 18 virus; 15 strains recovered from sick infants and 2 strains recovered from two of the attending nurses, who were apparently the healthy carriers, were all ECHO 18, and it is noteworthy that there was no evidence of inapparent infection with this virus among the other infants on the same wards who remained well.

The results obtained in this study of summer diarrheal disease are in many respects similar to those obtained in studies on the aseptic meningitis syndrome which has been etiologically associated with a very large number of distinct and unrelated viruses as well as with leptospira and protozoa. However, in the case of summer diarrheal disease we cannot even speak of a clinical syndrome, any more than we can speak of fever and headache as a syndrome, because diarrhea and vomiting are clinical manifestations of acute illnesses caused by a very large number of totally distinct etiological agents. The summer months in temperate zones are particularly conducive to the dissemination of enteropathogenic bacteria and viruses, which, especially in infants under one year of age, tend to produce acute, transitory illnesses with or without fever in which vomiting and diarrhea become prominent clinical manifestations. It is of interest, therefore, that by using only single rectal swabs and only two methods for virus isolation and very limited serologic tests, we have been able to associate enteropathogenic bacteria or viruses with approximately 80% of the 97 cases of summer diarrheal disease encountered among young infants and children in Cincinnati in 1956, the distribution being approximately as follows: enteropathogenic bacteria only (including Esch. coli, Shigella, and Salmonella), 22%; enteropathogenic viruses only (including ECHO, Coxsackie A and B, polioviruses, and adenoviruses), 44%; and double infection with enteropathogenic bacteria and viruses, 15%.

TABLE 10.—*Incidence of Dual and Single Infections With Viruses and Pathogenic Bacteria Among Children With and Without Diarrhea During the Summer of 1955 and 1956 in Cincinnati*

	1955			1956				
	Diarrhea			Diarrhea			No Diarrhea	
		Positive			Positive			Positive
Agent	No. Tested	No.	%	No. Tested	No.	%	No. Tested	No.	%
Viruses only	56	19	34	97	34	35	100	17	17
Pathogenic Esch. coli only	15	1	7	86	13	15	64	10	16
Pathogenic Esch. coli and viruses	15	2*	13	86	13†	15	64	3‡	5
Salmonella only	41	1	2	86	4	5	64	0	
Shigella only	41	1	2	86	2	2	64	0	
Shigella and viruses	41	3§	7	86	0		64	0	
Salmonella and viruses	41	0		86	0		64	0	

* Associated virus infections were 1 ECHO 12 and 1 ECHO 18.
† Associated virus infections were 5 ECHO 7, 1 ECHO 14, 3 ECHO (unclassified), 1 poliomyelitis (type 3), 1 Coxsackie B 5, and 2 cytopathogenic-newborn mouse pathogenic (unclassified).
‡ Associated virus infections were 3 Coxsackie A (not cytopathogenic for monkey kidney—not typed).
§ Associated virus infections were 1 ECHO 11, 1 Coxsackie B 2, and 1 cytopathogenic-newborn mouse pathogenic (unclassified).

Summary

The incidence of infection with various enteropathogenic viruses and bacteria was determined in 153 infants and children with diarrheal disease during the summers of 1955 and 1956 in Cincinnati,

and in 1956 also in a simultaneously sampled control group of children without diarrhea matched for age and socioeconomic status. Approximately 75% of the children were under one year of age. Monkey kidney tissue cultures and inoculation of newborn mice were the only methods used for recovery of viruses from rectal swabs obtained only once shortly after onset of illness. A large variety of enteroviruses (ECHO, Coxsackie A and B, polioviruses) and a small number of adenoviruses were recovered from about 50% of the children with diarrhea, and limited serologic tests indicated that acute viral infections also occurred in many children from whom no viruses were recovered. The ECHO viruses were predominant and their incidence was six times greater in the diarrhea group than in the control group, while the incidence of the Coxsackie A and B viruses and of the polioviruses was similar in both groups. Serologic tests on acute and convalescent phase serums indicated, however, that the diarrheal illnesses were associated in time with the onset of infections by the Coxsackie and polioviruses which are already known to produce a broad spectrum of clinical manifestations in human beings. Thirteen different serologic types were represented among the 42 ECHO viruses that were recovered from children with diarrhea.

Shigella and Salmonella organisms were recovered from only 9% of the children with diarrhea and from none of those without diarrhea. While the incidence of all enteropathogenic Esch. coli was not significantly greater in the diarrhea group (30%) than in the control group (20%), the serotype 0.111 B 4, which constituted 62% of all the recovered strains, was six times more frequent among the children with diarrhea; on the other hand, serotypes 0.119 B 14 and 0.125 B 15, which constituted about 50% of the strains recovered from the children without diarrhea, were not found at all among the children with diarrhea. Double infections with enteropathogenic bacteria and viruses were also encountered.

TABLE 11.—*Association of Most Prevalent Types of Pathogenic Esch. Coli and Various Viruses in Children with Diarrhea During Summer of 1956 in Cincinnati*

		No. Strains Associated with Indicated Virus											
		ECHO 7		ECHO 14		Coxsackie B5		Unclassified		Poliomyelitis		Total	
Serologic Type	Strains, No.	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0.111 B4	16	5	31	1	6	1	6	1*	6	0	0	9	56
0.55 B5	5	0	0	0	0	0	0	1†	20	1	20	2	40

* Cytopathogenic, newborn mouse pathogenic agent.
† Unclassified ECHO virus.

The results of the present study seem to warrant the conclusion that summer diarrheal disease in very young children is not an entity but rather a consequence of transitory infections with a large variety of enteropathogenic viruses and bacteria that are especially prone to produce diarrhea and vomiting as part of the clinical manifestations of infection in very young infants. Despite the limited methods we employed, it was possible to associate enteropathogenic viruses or bacteria or both with at least 80% of the 97 cases of summer diarrheal disease studied in 1956, the distribution being approximately as follows: enteropathogenic bacteria only (including Esch. coli, Shigella and Salmonella), 22%; enteropathogenic viruses only (including ECHO, Coxsackie A and B, polioviruses and adenoviruses), 44%; and double infection with enteropathogenic bacteria and viruses, 15%. None of the children died, and the disease was generally milder among the children from whom only viruses were recovered, although 53% of them were sick enough to require hospitalization.

TABLE 12.—*Incidence of Most Common Clinical Manifestations in Patients with Diarrhea from Whom Viruses or Pathogenic Bacteria or Both Were Recovered During Summer of 1956 in Cincinnati*

		% in Indicated Category					
Agents Recovered	No.	Hospitalization	Fever	Vomiting	Dehydration	Mucus in Stools	Blood in Stools
Viruses only	34	53	62	62	29	44	20
Pathogenic Esch. coli only	13	77	77	85	85	15	0
Viruses and pathogenic Esch. coli	13	92	61	61	92	23	0
Shigella or Salmonella	6	83	83	67	33	33	17

Addendum

Our associate, Dr. Hans J. Eggers, recently completed an analysis of the four unclassified, cytopathogenic, newborn mouse pathogenic strains listed in table 4 and found that the three 1955 strains consisted of (1) a mixture of Coxsackie A 9 and poliovirus 1, (2) a mixture of Coxsackie B 3 and an ECHO virus, and (3) an antigenic relative of ECHO 10; the 1956 strain proved to be a mixture of Coxsackie A 9 and B 4.

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References

1. Hodes, H. L.: Etiology of Infantile Diarrhea, in Advances in Pediatrics, edited by S. Z. Levine, Chicago, Year Book Publishers, Inc., 1956, vol. 8, pp. 13-52.

2. Higgins, A. R.: Case for Viral Diarrheal Disease, editorial, Am. J. Med. **21**:157-160 (Aug.) 1956.

3. Gordon, I.: Nonamebic Nonbacillary Diarrheal Disorders, Am. J. Trop. Med. **4**:739-755 (July) 1955.

4. Committee on Enteroviruses of National Foundation for Infantile Paralysis: Enteroviruses, Am. J. Pub. Health **47**:1556-1566 (Dec.) 1957.

5. Travassos, J., and others: Occurrence of Coxsackie Virus in Rio de Janeiro: II. Isolation of Virus from Infants with Gastroenteric Disturbances, An. Microbiol. **2**:83-88, 1952-1953.

6. Pohjanpelto, P.: Coxsackie Group of Viruses: Epi-

demiological Studies, Ann. med. exper. et biol. Fenniae (supp. 6) **33**:1-75, 1955.

7. Parrott, R. H.: Clinical Importance of Group A Coxsackie Viruses, Ann. New York Acad. Sc. **67**:230-240 (April) 1957.

8. Ramos-Alvarez, M., and Sabin, A. B.: Characteristics of Poliomyelitis and Other Enteric Viruses Recovered in Tissue Culture from Healthy American Children, Proc. Soc. Exper. Biol. & Med. **87**:655-661 (Dec.) 1954.

9. Ramos-Alvarez, M., and Sabin, A. B.: Intestinal Viral Flora of Healthy Children Demonstrable by Monkey Kidney Tissue Culture, Am. J. Pub. Health **46**:295-299 (March) 1956.

10. Ramos-Alvarez, M.: Cytopathogenic Enteric Viruses Associated with Undifferentiated Diarrheal Syndromes in Early Childhood, Ann. New York Acad. Sc. **67**:326-331 (April) 1957.

11. Wenner, H. A.; Miller, C. A.; Kamitsuka, P. A.; and Wilson, J. C.: Preparation and Standardization of Antiserums Prepared with Three Known Types of Poliomyelitis Viruses, Am. J. Hyg. **59**:221-235 (March) 1954.

12. References 4 and 10.

13. Edwards, R. P., and Ewing, H. W.: Identification of Enterobacteriaceae, Minneapolis, Burgess Publishing Co., 1956.

14. Melnick, J. L.: ECHO Viruses in Symposium on Cellular Biology, Nucleic Acids and Viruses, Special Publications New York Acad. Sc. **5**:367-381, 1957.

15. Karzon, D. T., in discussion of Melnick, J. L.: Echo Virus, Symposium on Cellular Biology, Nucleic Acids and Viruses, Special Publications New York Acad. Sc. **5**:388-390, 1957.

16. Eichenwald, H. F.; Ababio, A.; Arky, A. M.; and Hartman, A. P.: Epidemic Diarrhea in Premature and Older Infants Caused by ECHO Virus Type 18, J. A. M. A. **166**:1563-1566 (March 29) 1958.

17. Stulberg, C. S.; Zuelzer, W. W.; and Nolke, A. C.: Epidemic of Diarrhea of Newborn Caused by Escherischia Coli O-111, B$_4$, Pediatrics **14**:133-142 (Aug.) 1954. Olarte, J.; Ramos-Alvarez, M.; and Galindo, E.: Isolation of Shigella, Salmonella and Coli Enteropathogens from Rectal Swabs of 802 Cases of Sporadic Diarrhea, Bol. med. Hosp. Inf. **14**:263-268 (June) 1957.

18. Kjellen, L.; Zetterberg, B.; and Svedmyr, A: Epidemic Among Swedish Children Caused by Adenovirus Type 3, Acta Paediat. **46**:561-568 (Nov.) 1957.

TREATMENT OF THE ACUTE COMPLICATIONS OF CHRONIC ALCOHOLISM

USE OF AZACYCLONOL (FRENQUEL) HYDROCHLORIDE IN ONE HUNDRED CONSECUTIVE CASES

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The responses of 100 chronic alcoholic patients with acute complications were studied with respect to azacyclonol hydrochloride, a drug with marked antihallucinatory effect. It was given by mouth, generally in doses of one 100-mg. tablet four times a day, in addition to the medication usually given to patients who are psychologically and biologically in extremis. Of the 75 who had hallucinations, 60 recovered quickly and 8 were improved. The effects are illustrated by two case histories. By treating this group of patients successfully while they were in extreme situations, rapport and confidence were established which formed the basis for more definitive treatment of the patient's total problem. Hospitalization might have been useful in many cases, but it is believed that azacyclonol was of considerable help in treating these people at the outpatient level.

Where patients are received in a clinic such as the Adult Guidance Center, which is dedicated to the treatment of those who have a drinking problem, someone frequently arrives who is in biological and psychological extremis. This patient may be suffering from symptoms of starvation and dehydration as well as from confusion, extreme restlessness, hallucinations, nightmares, and autonomic nervous system syndromes indicating near collapse. Our clinic is not devoted to the drying out process only. We believe, however, that by treating this group of patients successfully while they are in extreme situations, rapport and confidence can be established which will be the foundation for more definitive treatment later of the total problem the patient brings. Some of our general policies and procedures have been described by Peltenburg [1] and Quiros,[2] and will not be covered in this paper.

In the course of assaying the value of new medicaments as they become available, azacyclonol (Frenquel) hydrochloride was tried, but little or no success was achieved in its use until the correct dosage had been determined. When this was estab-

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lished, through the reports of several investigators,[3] considerable success was achieved. Indeed, studies were begun on a series of 100 patients in order to verify our early nonstatistical conclusions regarding the benefit derived from azacyclonol.

Plan of Treatment

The drug was to be given primarily to those who had hallucinations; secondarily, to those who had such severe nightmares that sleep was too interrupted for adequate rest; and thirdly, to those who suffered from and admitted confusion of mentation.

The following statistics were kept in punch-card form, care being taken not to assay the treatment until at least two weeks had passed from the time it was begun: name, clinic number, date of initiation of treatment, age, sex, occupation, interval since last employment, date of return to work, marital status, number of marriages, interval since the last drink, length of binge, number of times delirium tremens had been experienced on previous occasions, type of hallucination and the period of the day when present, nightmares, confusion, psychiatric diagnosis (according to American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders, 1952), physical diagnosis, dosage method, frequency of administration of azacyclonol, adjunctive therapy, number of days of treatment with azacyclonol, results of treatment, and disposition of the patient at the end of treatment (or at time of statistical survey).

I did not diagnose and treat all of the patients recorded in this series; some were cared for by the seven psychiatrists and three internists on our staff. These physicians were told that a statistical assay was to be done and were instructed to note in the patients' folders certain facts, such as time of recovery from specific symptoms, return to work, and so on. They were not asked to code their opinions of the treatment.

A double-blind study was considered unnecessary, since this method of study had already been utilized by others.[4] Moreover, azacyclonol reverses electroencephalographic changes produced by *d*-lysergic acid diethylamide (LSD-25).[4b] We had previously observed the specific effect of azacyclonol in alcoholic patients receiving intravenous medicaments. In them, the drug relieves hallucinations, frequently before the needle is removed from the vein.

Numerical Assay

The series of patients was limited to exactly 100 so that numbers of patients would correspond to percentage of cases. The average age was 42.49 years, with extremes ranging from 27 to 66 years, and a standard deviation of 8.17 years, which correspond closely to the clinic general averages. The sex difference was 80 males to 20 females, a ratio of 4:1, which likewise is close to the clinic average. Only 38 of the group were married; of the 80 men, 35% were married, while of the 20 women, 60% were married. Of the whole group, 82 had been married at one time.

Occupationally, they were divided as follows, in order of frequency: craftsmen, 31; service, 19; labor, 15; professional and technical, 10; not in labor force, 7; clerical, 5; operative, 5; and sales, 4. Managerial personnel, entertainers, and farm groups supplied the remaining four.

In regard to length of the binge they had been on, 13 admitted 1 to 4 days; 13, 5 to 6 days; 15, 7 to 9 days; 16, 10 to 14 days; 12, two to three weeks; 4, three to four weeks; 4, four to five weeks; 4, five to six weeks; 3, six to eight weeks; 9, two to three months; 1, three to five months; and 3, over eight months. In three cases either the patients could not remember how long the binge had lasted or this fact was not recorded.

We questioned these patients concerning the interval between the time of the last drink and the time they sought help. Thirty-five were drinking when treatment was started; 33 took their last drink the day before; 20 had stopped in the previous 5 days; 3, a week prior to treatment; 6, 10 to 30 days before; 2, two to six months ago; and 1, a year ago. Those who had asked for treatment so long after cessation of drinking were not usually hallucinating but were complaining of extreme restlessness, bad dreams, or confusion, all leading to a desire to return to drinking and thus a return of the patient to a physician.

Statistics were kept regarding the time interval since last employment. Some of these are not pertinent here, but let it be noted that 10 of our group were employed at the time treatment was begun. This group of nine men and one woman included five persons who were actively hallucinating and three who were diagnosed as psychotic (only one of whom admitted hallucinations).

Our analysis of the number of times these patients had previously suffered delirium tremens referred usually to symptomatic and subjective statements concerning the frequency of occurrence of visual, auditory, or haptic sensations which could not be proved by them at the time and were thus considered subjective in origin. Sometimes the patients were sufficiently aware of the true meaning of delirium tremens to differentiate between it and hallucinosis, but not frequently. At any rate, 52 revealed that they had had delirium tremens 1 to 12 or more times before. Six in the group announced that there were too many times to recall.

In regard to physical illness occurring concomitantly with the psychiatric problem, 57 of the patients were found to have notable diseases or former operations of consequence. Peripheral neuritis led the list with 19 cases. There was evidence of fatty degeneration of the liver in eight, cirrhosis in four, and peptic ulcer in three. Gastrectomy had been performed in five. There was one case each of

the following illnesses: bronchial asthma, recent head injury, arthritis, hypertension, cardiac decompensation, and gastritis. Since gastritis is almost constantly present in the patient after a recent severe drinking bout, had it always been noted per se, the incidence would have been much greater. Illnesses carded as miscellaneous totaled 12%.

Psychiatric disorders were as follows, in order of frequency: nonpsychotic diagnoses included passive-aggressive personality, 30; inadequate personality, 25; emotionally unstable personality, 9; schizoid personality and cyclothymic personality, 2 each; and drug addiction, 1. Psychotic diagnoses included chronic brain syndrome, 2; acute brain syndrome, 2; agitated depressions, 2; unclassified psychosis, 1; and schizophrenia, 12.

It should be noted that psychoses accounted for 19 of the total group and, in all but the 4 brain syndromes, were not directly resultant from alcohol imbibition. It should also be noted that our psychiatrists did not make one diagnosis of alcoholism per se in these 100 "alcoholics," although 5 were left undiagnosed. In a larger group, other personality disorders would have been seen.

Of the total group, 66 had auditory hallucinations, 41 had visual hallucinations, and 2 had haptic hallucinations alone. Seventy-five patients had hallucinations, which occurred at night in all cases and in the daytime as well in 49. Treatment was given to 25 other patients who seemed on the verge of hallucinating and complained of bad dreams, almost total insomnia, and confusion.

The medicament, azacyclonol, was administered almost uniformly in a dose of one 100-mg. tablet four times a day. This was done in 87 of the patients treated, 4 being treated on a three times a day basis, one twice daily, one five times daily, one on scattered dosage, four on intravenous plus four times daily by mouth basis, one orally at bedtime only, and one intravenously for only one dose. Thus, 91 were on oral medication four times a day after the initial dose.

The medicine was given only one day in 14 patients, 2 days in 18, 3 days in 25, 4 days in 15, 5 and 6 days in 11, and as long as 13 days in 7. Ten patients continued therapy for more than two weeks, since they wished to do so. Six of these 10 were psychotic and claimed relief. The relatively short period of treatment reflects the prompt response to therapy, since the drug was not continued more than a day after cessation of symptoms. Some of these patients after having taken azacyclonol requested that treatment be continued; others asked for the drug by describing the tablet after its use had been discontinued by the physicians.

In no case was azacyclonol used alone, save in initial intravenous injections. In all other situations it was used as an adjunct to our usual medication for patients in severe condition.

Results

Of the total group, 57 were considered recovered and 27 improved, or a total of 84 recovered or improved. At the time of assay, 51 were again employed. It is assumed that a larger percentage would be employed if a later assay had been done. Of the 100 patients, only 6 were sent to the hospital, 6 discontinued treatment, and 4 were unimproved. Most patients in these latter three groups continued to drink and were thus unchanged or worse after initiation of treatment. It was not believed that any patient was made worse by the treatment. Of the group of 75 who hallucinated, 60 (80%) recovered quickly and 8 (11%) were improved, totaling 91%.

Report of Cases

CASE 1.—A divorced male of 46 years, a skilled laborer with a life-long history of alcoholism, reported to the clinic on March 28, 1957, after having been absent from treatment for 11 months. He stated that he had had difficulty in his relationship to a woman friend in that she began drinking. He, too, had been drinking for two weeks. He was very upset because of his current plight, as he was now friendless, jobless, almost totally insomnic, nauseated, anorexic, and uncontrollably shaky with profuse sweating, weakness, and exhaustion. He was treated immediately with parenterally given vitamins and dimenhydrinate (Dramamine), oral gastric sedatives, anesthetics, and a milk shake. He was given mephenesin (Tolserol), meprobamate, and barbiturates to take with him.

He returned the next day unimproved, and similar medicaments as well as adrenal cortical extract were given. The following day he returned on schedule, still miserable, insomnic, restless, and hallucinating. He complained of hearing doorbells and telephone bells which interrupted him repeatedly during the nights. At this visit, azacyclonol, 100 mg. four times a day, was ordered. On his next visit the following day, he reported being slightly less insomnic and was no longer hallucinating but he was still restless. Two days later he realized he was improving. "I'm coming around; I'm better, but still tense. I can't write yet," he volunteered. From then until the present writing, he has returned to the clinic about twice a week. He has been working steadily since April 10. Whether this patient could have been cared for in the clinic setting without the aid of azacyclonol is doubtful.

CASE 2.—This patient, a professional man of 32 years, with a history of intermittent drinking since 1944, heavily enough to cause him to lose jobs during the past three years, had begun treatment at the clinic on Jan. 22, 1957. After a few visits he had discontinued treatment but not the drinking. As a result, he had to enter a sanitarium, where he remained 72 hours and then signed himself out. He returned to the clinic the next day, on March 11, 1957, in a very frightened and disturbed condition, stating that he had been having both visual and auditory hallucinations. He was able to maintain some sort of intellectual interest in the phenomena which occurred, but without avail, for he became frightened both of the sensations and of the fact that he had become sicker than he had realized. He was given azacyclonol, 100 mg. intravenously, and reported immediate cessation of the disturbing sounds and figures. He relaxed visibly as the medicine took effect, but consciousness appeared to improve rather than to diminish as in a sedative approach. He had been taking chlorpromazine (Thorazine), 300 mg. per day, and was allowed to continue this, with the addition of azacyclonol, sedatives, and vitamins. There

were no further hallucinations, although he had kept everyone awake the previous night as he greeted people at the door, chased animals around the room, etc. He had ended up exhausted, frantic, and confused. He returned to work the day after azacyclonol was given intravenously, since he felt that he could afford no more time off the job. The hallucinations did not return. Azacyclonol was discontinued on the fourth day. He reported that he had received no specific treatment for his hallucinosis while in the sanitarium.

Comment

Differentiation between clearly demarcated delirium tremens and hallucinosis was not attempted. In an outpatient facility such as ours, continuous medical observation of the patient by trained personnel is not possible. The patient usually is cared for by a relative or a friend, but sometimes there is no one. Many of these patients recovered alone in their rooms, venturing out only to come to the clinic for treatment. Many had poor later recall of events leading up to their arrival at the clinic. Nearly all had been almost completely sleepless prior to arrival, but after treatment began to get sufficient rest for recovery. Sedation was almost uniformly used as part of the medical regimen, as were gastric anesthetics and sedatives, and mephenesin. A small percentage of patients received ataractic and tranquilizing medicaments, too. Some were given adrenal cortical extracts. One patient, addicted to both alcohol and amphetamine, experienced a reduction of hallucinations after intravenous administration of azacyclonol, but he could not maintain this reduction when the drug was given orally. This group of 100 patients were admitted to the clinic during the course of four and one-half months. They represent a relatively complete list of consecutively treated patients in a busy clinic. There were some, however, who were treated successfully in the same manner but who were not included in the series because of inadequate data in different areas, although their names were known; others failed to get on the roster and, therefore, could not be included.

While such patients have been treated without hospitalization more or less successfully in the past, the rate of success in this series was felt to be substantially increased and hastened by the use of azacyclonol. It is not meant here that we are against hospitalization of any patient who needs it, but rather it is believed that many physicians will find themselves in the position of having acutely sick patients who for reasons of indigency or lack of hospital beds cannot be treated in a hospital, and who therefore need the extra assistance of the type offered by this drug. Many more of these patients should have been hospitalized; perhaps all of them would have benefited by such care. It was not available to them for the following reasons: (1) actual lack of hospital space; (2) the patient's own reluctance to accept charity care; (3) fear of being committed to a state hospital as a result of his local hospitalization; and (4) unwillingness to afford the luxury of time off work.

Most of these patients were seen daily or twice daily in the clinic for the first several days. The psychiatric diagnosis was usually determined prior to the acute illness (as on a former admission) or after the early episode.

Conclusions

It has been shown that of 100 acutely ill patients suffering from the acute complications of prolonged alcoholic intoxication, most could be treated successfully as outpatients. Azacyclonol is of considerable help in the treatment of such patients in any situation, primarily through shortening the recovery period and making it tolerable. (If the recovery period is not tolerable, such patients use alcohol as a sedative or hypnotic, thereby really protracting and increasing the total illness.) Azacyclonol injected intravenously reduces fear and anxiety immediately by halting the hallucinatory images or sensations; when given by mouth, it appears to achieve the same result in similar but somewhat slower fashion. Sociological, biographical, and medical data have been offered to suggest a picture of the patients. The oral dose of azacyclonol was 100 mg. four times daily in most cases. The duration of administration of the drug as determined by recovery from the symptoms was generally less than four days.

150 Otis St. (3).

References

1. Peltenburg, C. M.: Casework with Alcoholic Patient, Social Casework **37**:81-85 (Feb.) 1956.

2. Quiros, A.: Adjusting Nursing Techniques to Treatment of Alcoholic Patients, Nursing Outlook **5**:276-279 (May) 1957.

3. (*a*) Rinaldi, F.; Haynes, E. E.; Rudy, L. H.; and Himwich, H. E.: Therapeutic Effects of Azacyclonol in Psychotic Patients, in Symposium on Tranquilizing Drugs, edited by H. E. Himwich, Washington, D. C., American Association for the Advancement of Science, Publication 46, 1957, pp. 115-123. (*b*) Toll, N.: Azacyclonol as Adjunct to Psychotherapy, in Symposium on Tranquilizing Drugs, edited by H. E. Himwich, ibid., pp. 103-113. (*c*) Pennington, V. M.: Two-Year Comparative Study of Ataraxics in Neuropsychiatric Patients, J. Am. Geriatrics Soc. **5**:421-429 (April) 1957. (*d*) Fabing, H. D., and Hawkins, J. R.: Year's Experience with Frenquel in Clinical and Experimental Schizophrenic Psychoses, Dis. Nerv. System **16**:329-338 (Nov.) 1955.

4. (*a*) Mason Browne, N. L.: Selection of Patients for Treatment with Alpha-4-Piperidyl Benzhydrol Hydrochloride, J. Nerv. & Ment. Dis. **123**:130-140 (Feb.) 1956. (*b*) Rinaldi, F.; Rudy, L. H.; and Himwich, H. E.: Use of Frenquel in Treatment of Disturbed Patients with Psychoses of Long Duration, Am. J. Psychiat. **112**:343-348 (Nov.) 1955. (*c*) Odland, T. M.: Azacyclonol (Frenquel) Hydrochloride in Treatment of Chronic Schizophrenia: Double-blind, Controlled Study, J. A. M. A. **165**:333-335 (Sept. 28) 1957. (*d*) Reference 3*a*.

METHOCARBAMOL—NEW AGENT IN TREATMENT OF NEUROLOGICAL AND NEUROMUSCULAR DISEASES

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If one accepts the theory that spasticity is the result of the release of the spinal cord from the inhibition of higher centers, in both the brain stem and cortex, resulting in a sustained reflex increase in tonus, extensor in the lower and flexor in the upper extremities, then it will be seen that a drug, to be effective, must either restore the "inhibition" to the cord or break up the sustained reflex activity. The ideal lissive agent should have a long therapeutic effect, be available in an oral preparation, and, if side-effects are present, have a ratio between toxic and therapeutic dosage great enough that the side-effects are not more incapacitating than the primary condition. With methocarbamol a good result was obtained in 72% of patients with both acute and chronic spasm. An improvement in all patients with incoordination was observed. Methocarbamol is of value in muscle spasm and severe flexor spasms accompanying cord disease and has as well a more limited use in the treatment of incoordination.

The need for a substance which would reduce spasticity, rigidity, and muscle spasm, as well as prevent the formation of contractures in neuromuscular diseases, has led to the investigation of several agents which were purported to have a beneficial effect on spasticity without causing a proportionate weakness, that is, not changing a spastic weakness into a more disabling flaccid weakness. The term "lissive" has been used to designate this action.[1]

Up to this point the promising group of substances has been mephenesin, meprobamate, and zoxazolamine. There has been some disappointment regarding the effectiveness of these preparations. The results vary greatly as to the type of observation and type of patients and whether spasticity arises from the supraspinal or spinal levels. Unfortunately, most observations must be subjective. There is no good objective test to evaluate the effect of drugs clinically. While the electromyogram offers a direct measurement test, to be really objective it should be done at regular intervals and not just at the time the drug is administered intravenously. This is difficult to arrange for a large number of patients.

Many drugs are effective in reducing spasticity for short periods but must be given in high doses, and usually the effects wear off too quickly to be of value. To be effective, then, the ideal lissive agent should have a long therapeutic effect, be available in an oral preparation, and, if side-effects are present, have a ratio between toxic and therapeutic dosage great enough that the side-effects are not more incapacitating than the primary condition.

In view of the large number of patients who have neuromuscular and neurological diseases and the minimal effectiveness of preparations presently available, new pharmacological fields must be plowed until the ideal drug is found, since it is not likely that surgical procedures, at least in the case of spasticity, will ever be the complete answer. Consequently, we have studied the effectiveness of a new preparation, methocarbamol, on a new group of patients with neuromuscular and neurological diseases.

Methocarbamol (Robaxin) is 3-o-methoxyphenoxy-2-hydroxypropyl-1-carbamate. It is derived from guaiacol glyceryl ether, and the skeletal muscle relaxing properties of the parent compound were described by Ginzel.[2] The pharmacodynamic studies performed by Truitt[3] demonstrated that methocarbamol produced a prolonged relaxing effect on skeletal muscle through a depression of spinal multisynaptic pathways with no effect on monosynaptic reflexes. Solomon[4] observed that methocarbamol had no effect upon motor nerves, muscle, myoneuronal junction, or monosynaptic arcs. These studies confirmed the observation of Truitt that the site of action of methocarbamol is at the interneuronal junction in the spinal cord. Morgan and associates[5] reported determinations of plasma levels of methocarbamol in the dog after oral and intravenous administration.

These voluntary muscle relaxing qualities, in addition to the wide therapeutic range, suggested the clinical application of methocarbamol in a wide variety of neuromuscular disorders. To a selected group of patients the drug was administered in a dosage from 1 to 4 Gm. daily in divided doses. No patient is included in this report who was on the medication less than two months if his condition was chronic and two weeks if his condition was acute, unless recovery occurred promptly. The ma-

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jority of the patients with severe spasticity and contractures received the preparation for six months to a year.

Patients were selected to include a representation of the main problems of neurological and neuromuscular disease, namely (*a*) spasticity, represented by patients with multiple sclerosis, primary lateral sclerosis, traumatic spinal cord disease, and heredofamilial degenerative disease; (*b*) rigidity, as seen in Parkinsonism; (*c*) contractures, as seen in muscular dystrophy; (*d*) incoordination, as found in such spinocerebellar and cerebellar diseases as multiple sclerosis and heredofamilial degenerative disease; and (*e*) muscle spasm, as in poliomyelitis, fibromyositis, and secondary to herniated nucleus pulposus. There were 70 patients and 75 trials performed. The distribution of clinical trials is seen in the table.

Results According to the Major Symptomatic Problem

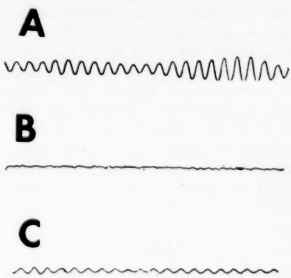
Spasticity.—Eighteen patients had spasticity of a severe degree as the primary problem. These included some patients with multiple sclerosis whose weakness was not in proportion to the degree of spasticity and the traumatic paraplegias where spasticity was both incapacitating and accompanied by a severe reflex muscle spasm. Since there are no foolproof methods to objectively evaluate the results of treatment in spasticity we use the following criteria: (1) the appraisal, by the patient himself and members of the family, of the patient's progress and decrease in pain, and (2) the grading of spasticity and reflex change by the examiner. To eliminate as far as possible the difference in interpretation between examiners, patients were followed by a single examiner.

Distribution of Patients and Results of Seventy-five Clinical Trials with Use of Methocarbamol

Symptoms	Diagnosis	Patients, No.	Results			
			Good	Fair	Poor	Improved, %
Spasticity	Multiple sclerosis	12				
	Primary lateral multiple sclerosis	2				
	Adhesive arachnitis	1				
	Traumatic paraplegia	3				
		18	0	0	18	0
Rigidity	Parkinsonism	4				
	Cephalic tetanus	1				
		5	0	1	4	25
Contractures	Muscular dystrophy	19	0	0	19	0
Incoordination	Spinocerebellar ataxia	2				
	Multiple sclerosis	6				
		8	4	4	0	100
Muscle spasm*	Acute	17	17	0	0	100
	Chronic	8	0	0	8	0
		25	17	0	8	72

* Muscle spasm group included diagnoses of herniated disk, fibromyositis, torticollis, and poliomyelitis.

Using the above criteria, no patient was considered to have had more than a moderate decrease in spasticity. If any change occurred it was not enough to be of clinical advantage. On the other hand, the painful reflex spasms seen in four patients with severe pyramidal tract disease were completely eliminated in one patient and markedly decreased in two others, representing an improvement in three of four cases. No patients developed an increase in weakness such as we have observed and which has been reported in the use of some other lissive agents.[6] Generally, the reflexes were unaffected except in one patient with multiple sclerosis in whom Babinski signs and hyperactive knee jerks disappeared during treatment and gradually returned when the therapy was discontinued.



Tremogram showing effect of methocarbamol on rate and amplitude of typical Parkinsonian tremor. *A*, before intravenous administration. *B*, pattern starting 15 minutes after injection and lasting one to one and one-half hours. *C*, two hours after injection.

Rigidity.—Four patients with Parkinsonism and one patient with cephalic tetanus were included in this study. In the former patients there was subjective improvement in one patient but no sustained improvement in the rigidity. Intravenously administered methocarbamol in one patient had a definite short effect on the severe tremor; however, prolonged treatment with the oral preparation was ineffective. A tremogram is shown in the figure, indicating a transient effect on the tremor in this patient. The patient with cephalic tetanus was graded as having 40% total improvement when sustained on intravenous injections. He was not sustained by oral medication.

Contractures.—Nineteen patients with muscular dystrophy and various stages of contracture ranging from tightness of the Achilles tendons and the iliotibial bands to severe deforming contractures were treated for over one year with methocarbamol. At the end of that time 7 remained the same and 12 had become worse. Comparing these results with another experimental preparation used in the same way, the results were approximately the same.

Incoordination.—Of eight patients in whom cerebellar signs were marked, four showed a noticeable improvement in speech and ability to perform coordinated actions. Obviously it is impossible to quantitate this improvement; however, in two pa-

tients who improved, there was regression with withdrawal of the drug and reimprovement on return to the therapeutic regimen.

Muscle Spasm.—Twenty-five patients were represented in the group with muscle spasm. In 18 cases of acute disease there were excellent results. These included six cases of herniated lumbosacral disk and eight cases of acute fibromyositis from either trauma or inflammation. These patients had alleviation of symptoms promptly, and the results were lasting with an average total dose of 4 Gm. Moderate relief occurred in two cases of herniated disk and one case of poliomyelitis. In one case of spasmodic torticollis secondary to herpes zoster involving cervical roots, retreatment was necessary after an initial relief. In seven cases, which included two cases of torticollis and four cases of chronic fibromyositis of the cervical tension type, there was no remarkable relief. The results are summarized in the table.

Comment

The problem of alleviating spasticity is an extremely complex one. If one accepts the theory that spasticity is the result of the release of the spinal cord from the inhibition of higher centers, both in the brain stem and cortex, resulting in a sustained reflex increase in tonus, extensor in the lower and flexor in the upper extremities, then it will be seen that a drug, to be effective, must either restore the "inhibition" to the cord or break up the sustained reflex activity. Since this inhibition comes from many areas, e. g., cortex, reticular substance of the brain stem,[7] basal ganglions,[8] and cerebellum, it would require that a drug have a selectivity for these areas to show any degree of effectiveness. There is, however, the possibility that certain lesions may be more likely to respond to centrally acting agents, and indeed this is true clinically. Spasticity from lesions of the cortex is less severe than that of subcortical origin.[9] Furthermore, the spasticity resulting from cortical lesions, as seen in cerebral palsy, have been the most responsive to the use of lissive agents.[10] This, however, may not be due necessarily to the selectivity of the drug, since it is well known that the spastic hemiparesis resulting from lesions occurring in childhood is quantitatively different from that which occurs in adult life. This has been postulated as being the result of the development of ipsilateral innervation.[11]

It is further evident that with spinal cord lesions no drug, whether acting on multineuronal or monosynaptic circuits, is likely to have much effect unless it affects the overactive reflex pattern at the segmental level. Morphine and codeine seem to be effective here, but, due to the dangers inherent in their use, they are not ideal drugs for long-term therapy. Perhaps the ideal medicament would be a combination of synthetic opiate derivatives, which have been discarded because of lack of central effect, together with the central relaxants or lissive agents.

Rigidity poses a problem different only in that it results from activity, or lack thereof, above the cord. The pathophysiological mechanism is not fully understood, however, it is certain again that we are dealing with multisynaptic mechanisms. We are further along in our knowledge of the treatment of rigidity than of spasticity since the anti-Parkinson drugs have proved to be useful in the reduction of rigidity in patients with Parkinsonism, at least in the early and milder stages. Furthermore, surgical procedures on a single level, such as chemopallidectomy, have ameliorated the symptoms of rigidity in a significantly high percentage of cases.[12]

Muscle spasm is closely related to spasticity in some respects but different mainly in that there is no full or permanent loss of higher center inhibition to the cord, and hence it is not truly a state of uninhibited, increased stretch reflex. A possible explanation is that the spasm may be the result of maintained tension as a reflex response to pain.[13] In any case the response to lissive agents is much more gratifying here than in the case of spasticity and rigidity. In the case of contractures it is easily understood why no response is obtained. These cases represent structural defects rather than increase in tonus on reflex basis. Therefore, drugs acting on the brain or cord would have little effect in restoring normal elasticity.

A noticeable improvement in cerebellar signs with methocarbamol is difficult to understand unless one considers that cerebellar abnormality may be an overplay on the "input" or sensory side resulting in exaggerated efferent activity. If this is true, the effect of the medication may be the blocking of multisynaptic systems with reduction of a sensory "shower" to the cerebellum. This is only one of the many areas which will need investigation before our understanding of the physiology or treatment of these symptoms is complete.

Summary

The results of methocarbamol (Robaxin; 3-o-methoxyphenoxy-2-hydroxypropyl-1-carbamate) administration were evaluated in 75 trials performed in 70 patients with skeletal muscle hyperactivity secondary to neurological disorders. Efficacy of drug administration was determined by the degree of change in major symptomatology, such as spasm, incoordination, contractures, rigidity, and spasticity. An excellent result, after methocarbamol administration, was obtained in all patients with acute skeletal muscle spasm. A good result was obtained in 72% of the patients with both acute and chronic spasm. An improvement in all patients with incoordination was observed. This response was considered good in one-half of the group and fair in the others. At the dosage administered (1 to 4 Gm. per day) failures were noted in all patients studied with contractures, rigidity, spasticity, and chronic fibromyositis. Methocarbamol is of value in muscle spasm and severe flexor spasms accompanying cord disease and has as well a more limited use in the

treatment of incoordination. Further investigation regarding this and similar drugs is warranted in the investigation of treatment for spasticity and rigidity.

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The methocarbamol used in this study was supplied as Robaxin by the A. H. Robins Company, Inc., Richmond, Va.

References

1. West, R.: Pharmacology and Therapeutics of Curare and Its Constituents, Proc. Roy. Soc. Med. **28:**565-578 (March) 1935.

2. Ginzel, K. H.: Vergleichende Untersuchung einiger antikonvulsiv wirksamer Glyzeriniither, Arch. exper. Path. u. Pharmakol. **212:**331-338, 1951. Ginzel, K. H.; Leupold-Löwenthal, H.; and Weis, W.; Animal Tests of Myocain, Wien. med. Wchnschr. **99:**299-300 (June 25) 1949.

3. Truitt, E. B., Jr., and Little, J. M.; J. Pharmacol. & Exper. Therap., to be published.

4. Solomon, S.: Personal communication to the authors.

5. Morgan, A. M.; Truitt, E. B., Jr.; and Little, J. M.: Plasma Levels of Mephenesin, Mephenesin Carbamate, Guaiacol Glyceryl Ether, and Methocarbamol (AHR-85) After Oral and Intravenous Administration in Dog, J. Am. Pharm. A. (Scient. Ed.) **46:**374-377 (June) 1957.

6. Amols, W.: Clinical Experience with New Muscle Relaxant Zoxazolamine, J. A. M. A. **160:**742-745 (March 3) 1956.

7. Magoun, H. W., and Rhines, R.: Inhibitory Mechanism in Bulbar Reticular Formation: J. Neurophysiol. **9:**165-171 (May) 1946.

8. Dusser de Barenne, J. G., and McColloch, W. S.: Sensiorimotor Cortex, Nucleus Caudatus and Thalamus Opticus, J. Neurophysiol. **1:**364-377 (July) 1938.

9. Precentral Motor Cortex, edited by P. C. Bucy, Illinois Monographs in Medical Sciences, Urbana, University of Illinois Press, 1944, chap. 14.

10. Abrahamsen, E. H., and Baird, H. W. III: Use of Zoxazolamine (Flexin) in Children with Cerebral Palsy: Preliminary Report, J. A. M. A. **160:**749-751 (March 3) 1956.

11. Lassek, A. M.; Woolsey, C. N.; Walker, A. E.; and Boshes, B.: Pyramidal Tract, Neurology **7:**496-509 (July) 1957.

12. Cooper, I. S.: Intracerebral Injection of Procaine into Globus Pallidus in Hyperkinetic Disorders, Science **119:** 417-418 (March 26) 1954; Relief of Juvenile Involuntary Movement Disorders by Chemopallidectomy, J. A. M. A. **164:**1297-1301 (July 20) 1957.

13. Magoun, H. W., and Rhines, R.: Spasticity: Stretch Reflex and Extrapyramidal Systems, Springfield, Ill., Chas. C Thomas, Publisher, 1947, p. 27.

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METHOCARBAMOL (ROBAXIN) IN ORTHOPEDIC CONDITIONS

PRELIMINARY REPORT OF ONE HUNDRED CASES

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During pharmacological studies of methocarbamol (Robaxin) at the Bowman Gray School of Medicine, the drug was administered to a laboratory technician who was suffering from a herniated cervical disk. The relief of pain and muscle spasm in this patient (who had not responded to conservative measures prior to drug therapy) was so significant that additional clinical trials were instituted. The results observed with this compound in 100 patients are the basis of this report.

The problem of pain due to involuntary spasm of skeletal muscle is one that frequently confronts the orthopedic surgeon. This spasm usually arises as a protective mechanism when the body attempts to splint a part that would be painful if moved. In time the muscle spasm itself may become painful, and contribute as much or more to the patient's discomfort as the original condition. Consequently, an important part of the treatment of many orthopedic conditions or injuries is directed toward the relief of pain due to muscle spasm. Furthermore, spasm of the surrounding musculature frequently interferes with the reduction of a fractured bone, a dislocated joint, or a herniated disk.

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The ability of methocarbamol to relax spastic muscles was noted incidentally to other studies, but was found to merit special investigation. The effects here reported were obtained in 58 patients with acute orthopedic conditions (especially herniated lumbar and cervical disks) causing painful muscular spasms, 7 patients with chronic conditions, and 18 patients recovering from orthopedic surgery. The average oral dose of methocarbamol was 6 Gm. per day in divided doses, using 500-mg. scored tablets. The relief from pain was often prompt and striking. The resultant facilitation of treatment and hastening of recovery is exemplified in four case histories. Side-effects were minor, but occasionally made it necessary to reduce or interrupt medication. Methocarbamol was particularly useful in such procedures as reducing dislocated shoulders without anesthesia and manipulating spastic feet.

Recently, a number of new drugs have been introduced which have the property of relaxing the involuntary contraction of these skeletal muscles to a variable degree. Unfortunately, most of these drugs have unpleasant or undesirable side-effects which make them less useful or somewhat hazardous.

In my clinical experience, methocarbamol has afforded greater relief of muscle spasm and pain for a longer period of time without undesirable side-effects or toxic reactions than any other commonly used relaxants such as mephenesin, meprobamate, zoxazolamine, or chlorpromazine.

Pharmacology

Methocarbamol [3-(o-methoxyphenoxy)-2-hydroxypropyl-1-carbamate] was synthesized by Murphey in 1953.[1] The pharmacological actions of this compound were determined by Truitt and Little [2] at the Bowman Gray School of Medicine. They demonstrated that methocarbamol inhibited polysynaptic spinal reflexes while it had no effect on monosynaptic reflex arcs. Their studies indicated that this drug did not directly influence skeletal muscle and that voluntary muscular relaxation was a result of a selective action of this compound upon the central nervous system. They recognized its possible use as an effective and safe skeletal muscle relaxant and suggested that I use it clinically.

Selection of Patients

The present study carried out during the past year comprises a clinical evaluation of 100 patients suffering from painful conditions of an orthopedic nature. Fifty-eight of these patients had acute conditions, including 39 with herniated disks, 11 with muscular or ligamentous strains, 3 with torticollis, and 5 with contusions, multiple fractures, and muscle soreness due to accidents. There were 12 patients with chronic conditions. Seven of these had arthritis, myositis, and fibrositis, while five had night cramps.

In a postoperative group of 18 cases, methocarbamol was administered to relieve voluntary muscle overactivity. The remaining 12 cases included dislocations of the shoulder, spastic flatfoot, tetanus, and low back pain due to tension. In 2 out of the 100 patients studied a significant amount of dizziness and nausea occurred, and in these the drug was discontinued before any improvement could be noted.

The patients ranged in age from 12 to 78 years, with an average age of 40. Since the drug was so well tolerated and there appeared to be no contraindication to its use in children, I feel that further study in patients under 12 years of age is indicated. This is contemplated in the near future, based upon the encouraging results obtained by another investigator.[3]

Criteria for Evaluation

Five of my associates and I appraised the patient's response, making every effort to be as objective as possible. The results of necessity depended upon the clinical judgment of this group, as they must in any other study of this type, with the exception of those cases where objective measurements could be made. My experience with similar groups of cases judged in the same way, but treated with other muscle relaxants or physical therapy and conservative methods, served as a basis of comparison.

Method of Administration

The average oral dose of methocarbamol was 6.0 Gm. per day in divided doses, using 500-mg. compressed, scored tablets. An intravenous preparation containing 2.5% of methocarbamol in saline solution was also used. The dose was usually 500 to 625 mg. three to four times a day, and this was injected over a period of approximately one to two minutes. On occasion, 1 Gm. of methocarbamol in saline solution was placed in a flask of 5% dextrose solution as an intravenous drip over a period of three to four hours, after an initial intravenous injection of 500 mg.

It is undoubtedly true that larger doses could have been used in both oral and intravenous administration, because the incidence of side-effects was so low and these reactions were so mild. As much as 6 Gm. of the drug have been injected as rapidly as possible in a patient under anesthesia with no toxic effects and no depression of respiration.[4]

Response to Therapy

The benefit obtained by the use of the drug was judged to be pronounced when the patients became much more comfortable and their muscle spasm disappeared. When a demonstrable satisfactory effect was obtained by drug administration, but less than in the first category, with incomplete relief of pain and muscle spasm, the results were graded as moderate. When no response was obtained the results were judged as none.

Acute Cases—58 Patients.—In 39 patients with herniated lumbar and cervical disks, who received methocarbamol for relief of pain and muscle spasm, the response was judged to be pronounced in 25. In most instances the attacks subsided quickly, so that the patients could continue to work or go back to work sooner than expected.

Case 1.—The diagnosis in this 43-year-old male was herniated cervical disk at C-6 on the right. He had had recurrent episodes of pain and stiffness of the neck for four to six months. The present episode of one week's duration consisted of pain in the neck and pain and numbness, with some weakness, in the right arm. There was marked limitation of motion of the neck and a persistent torticollis. An absent right triceps reflex and atrophy of the right triceps muscle were noted.

The patient was started on therapy with 1 Gm. of methocarbamol every four hours and the dosage was increased to 1.5 Gm. every four hours after the first three days. He received physiotherapy and was unable to tolerate head halter traction. He left the hospital after four days and continued the medication at home for a week. He was very much improved on his return visit. He then continued the

drug for 10 additional days and returned with a full range of motion and no pain, although he still had the motor weakness and absent right triceps reflex.

The patient had an acute recurrence two weeks later, but this was again relieved with methocarbamol in about two days; he has had no further difficulty.

In 13 patients with herniated disks a moderate response was obtained. There was no response to drug therapy in one patient of this group, who received only 2 Gm. of methocarbamol daily. This is now considered an ineffective dose for most people.

In patients with herniated disks the painful episodes and muscle spasm subsided in 33 patients, 4 required surgery, one went elsewhere for treatment when surgery was advised, and one patient was still having difficulty when last seen.

Case 2.—This 55-year-old male with a recurrent herniated lumbar disk was first started on methocarbamol therapy on Aug. 28, 1956. He received 4 to 6 Gm. daily for a period of two weeks. Treatment also included bed rest and a back brace. There was some improvement in relief of pain and muscle spasm during the first week; however, after two weeks the patient was completely free of symptoms. There were no side-effects, and it is interesting to note that the patient had a peptic ulcer and was intolerant to aspirin, codeine, or meperidine (Demerol) hydrochloride. Methocarbamol, however, was well tolerated.

In 11 patients with acute muscular or ligamentous strains, including three cases of severe whiplash injuries of the cervical spine, a pronounced response was obtained in 6 and a moderate response in 5 patients. In three cases classified as acute torticollis, a significant degree of relief of pain and spasm and return of motion occurred in less than 24 hours.

Methocarbamol was given intravenously to one of these patients, and the response was observed in less than five minutes. The drug was given in five accident cases for relief of pain due to muscle spasm and generalized "soreness." The response was judged to be pronounced in three and moderate in two.

Chronic Conditions.—In the seven patients with chronic arthritis, myositis, and fibrositis, the response was pronounced in four and moderate in three. In five patients with night cramps in their legs or abductor muscle from hip difficulties, three obtained a pronounced response and two a moderate result.

Postoperative Group.—Eighteen patients received methocarbamol during their immediate postoperative period. In eight the response was judged to be pronounced because relief of pain and spasm was quite dramatic. They were able to move about better in bed, became ambulatory sooner, and required much less narcotic after they were started on methocarbamol therapy. The results in 10 patients were judged as moderate, because the drug was thought to be helpful but the response was less dramatic.

Case 3.—The diagnosis in this 54-year-old male was old nonunion fracture of the neck of the femur with aseptic necrosis. On Jan. 11, 1957, a replacement arthroplasty was performed with insertion of an F. R. Thompson femoral-head prosthesis. An adductor tenotomy was also done. Postoperatively, he had a great deal of pain and muscle spasm due to long-standing contractures and shortening of the muscles about the right hip. He complained bitterly of pain and was unable to help himself or move about in bed.

On the second postoperative day the patient was started on therapy with 1 Gm. of methocarbamol by mouth every four hours during the day and as needed at night. Within 24 hours the patient was much more comfortable and was moving himself about in bed. He was out of bed within two days after starting therapy, and getting about on crutches and starting active exercise of his hip. He required no narcotics 24 hours after the institution of the oral medication with methocarbamol.

Miscellaneous Conditions.—In three patients in this group with anterior dislocation of the shoulder, methocarbamol was given intravenously along with the usual dose of meperidine. All three obtained sufficient muscle relaxation to allow an easy reduction of the shoulder without anesthesia.

Case 4.—This 20-year-old male had recurrent dislocation of the shoulder. There were three previous dislocations of this shoulder and the present one occurred 45 minutes before he was seen, when he reached backward to close a car door. He stated that his shoulder had always been very difficult to reduce and that no physician had ever been able to do it by pulling his arm or manipulating and that he required anesthesia. He was given 100 mg. of meperidine intramuscularly 30 minutes before and 50 mg. of meperidine intravenously just previous to the intended manipulation. He withstood the pain of the manipulation very well but was unable to relax his muscles enough to permit the shoulder to be reduced, in spite of the fact that several different maneuvers and positions were tried.

He was then given 20 cc., or 500 mg. of methocarbamol intravenously and in less than one minute there was some twitching of his muscles and they visibly relaxed. Then, with a minimum of traction and no pain, the shoulder was slipped into place without difficulty. The patient was able to sit up immediately and the Velpeau bandage was applied to his shoulder. Except for the drowsiness and dizziness attributable to the large dose of meperidine he had no visible reaction.

This is an excellent example of a procedure for which success depends upon good muscle relaxation and for which the intravenously administered form of methocarbamol worked very well.

The intravenous administration of methocarbamol in one patient with spastic flatfoot enabled manipulation without anesthesia. There was one case of tetanus with generalized severe tetanic muscle contractions. This condition was safely and easily controlled by methocarbamol given intravenously at first and later by stomach tube. (This case is to be reported in detail in a separate paper.)

The results in five patients with low back pain due primarily to anxiety and tension states were judged to be moderate in two and none in three. All results are tabulated in table 1.

Side-effects

No serious reactions to this drug and very few unpleasant side-effects have been observed. Tabulation of side-effects is contained in table 1. Four patients complained of lightheadedness, but this usually was improved as drug therapy was either continued or the dose lowered. There was nausea in three cases but not vomiting or diarrhea. Meperi-

dine was administered in two of these patients who received methocarbamol intravenously for reduction of anterior dislocation of the shoulder. Since it could not be determined whether this was entirely due to meperidine or in part to methocarbamol, these were considered as possible side-reactions to the latter drug. In the third patient, the drug was discontinued before an effect could be observed because of this complaint.

Headache was reported by one patient, and one patient after operation apparently ran a fever, with temperature of 102 to 103 F (38.9 to 39.4 C) from this drug. At least, the temperature came down to normal after the drug was discontinued.

TABLE 1.—*Response of 100 Orthopedic Patients to Methocarbamol Therapy*

Selection of Cases	No. of Patients	Response: Pronounced	Response: Moderate	Response: None	Side-effects	No.
Acute 58						
Herniated disks (lumbar and cervical) ...	39	25	13	1	Slight lightheadedness	1
					Slight light headedness†	1
Ligamentous strains..	8	4	4		Headache†	1
Whiplash injuries	3	2	1			
Torticollis	3	3				
Accident	5	3	2			
Chronic 12						
Arthritis, myositis, fibrositis	7	4	3			
Night cramps	5	3	2			
Postoperative 18	18	8	10		Possible fever dizziness†	1
Miscellaneous 10						
Anterior dislocation of shoulder	3*	3			Dizziness, nausea‡	1
					Light headedness	1
					Dizziness nausea‡	1
Spastic flatfoot	1	1				
Tetanus	1	1				
Low back pain associated with anxiety	5		2	3		
Dropped from study ...	2			2	Nausea	1
					Light headedness	1
	100	57	37	6		

* Methocarbamol given intravenously.
† Disappeared on reduction of dose.
‡ Meperidine also given.

There were no skin reactions, joint reactions, or hemolytic disturbances or jaundice in this group of 100 cases. Subsequent use of the drug has resulted in two cases of allergic-type skin reaction, in my experience. Several patients reported mild drowsiness and for that reason one or two were unable to take the medicament and continue working.

In summary, then, side-effects were elicited in 10 out of 100 patients. In two patients the simultaneous administration of meperidine may have been the cause of the patient's symptoms. Drowsiness and lightheadedness disappeared after slight reduction of the dose in three patients, so that they were still afforded benefit from the medication. The reactions and side-effects were strikingly less than with other drugs previously used for the same purposes, but they should be watched for carefully with methocarbamol, just as with any other new drug.

Comment

In evaluating the effect of this drug, one must keep in mind the purpose for which it was given. It is known to have its main effect on multisynaptic reflexes within the spinal cord, and was used in this series of cases primarily to relax spastic voluntary muscle and relieve the discomfort associated with it. Many of the cases are of a mechanical type disorder and must be relieved by mechanical means. It is inane to think of a tablet or injectable solution actually reducing a dislocated shoulder or pushing a herniated disk back into place; but if the drug produces muscle relaxation, sufficient to allow the shoulder or disk to be reduced more easily, then it has fulfilled the purpose for which it was given. In fact, if the disk is completely ruptured so it cannot go back into place and must be removed, the action of the drug should still be considered a success if it has produced temporary relief of muscle spasm and discomfort under such circumstances.

Investigators in the field of "pain mechanisms" often advance the theory that the multisynaptic reflexes in the spinal cord are responsible for the augmentation and perpetuation of painful stimuli. It would seem that methocarbamol might be quite effective in producing the physiological block that is often necessary to interrupt this self-perpetuating mechanism and relieve such a reflex dystrophy. In fact, that may have been its *modus operandi* in some of these cases in which the clinical diagnosis was not as definite as the relief that was obtained.

There was no selection of the cases to be included in this series. It contains all that could be located, on which there was an adequate follow-up. The pertinent information on 24 representative cases has been extracted for presentation in table 2. In order to give the reader a clear concept of the response he might expect to see in several types of patients studied, four cases were presented in greater detail.

Summary

In a clinical study, 100 orthopedic patients with painful muscle spasm were evaluated from the standpoint of their response to the administration of methocarbamol (Robaxin). The results after administration of methocarbamol were as follows: A significant response was noted in 94% of these cases (57% pronounced, 37% moderate, 6% none). Minor side-effects noted in 10% of the patients disappeared in three on reduction of dosage.

Orally given methocarbamol was used effectively for relief of the severe pain and muscle spasm of acute torticollis and herniated inter vertebral disks

TABLE 2.–*Data on Representative Cases*

Age	Sex	Date	Diagnosis and Findings	Dosage Schedule (Gm.) and Treatment	Side-effects	Response
29	M	8/28/56	Acute herniated disk, lumbar; severe pain, spasm, and limited motion	6-9 per day, orally for 2 wk.; bed rest and brace	None	Good relief of pain and muscle spasm in 24 hr.; herniated disk subsided in 2 wk.
34	M	8/29/56	Postoperative lumbar ruptured disk; "cramps" in both legs at night	1 at bedtime and repeated in 4 hr. if awakened	None	Good relief of "cramps"
33	F	8/30/56	Herniated cervical disk; pain and numbness in neck and right arm; muscle spasm and limited motion in neck	6 per day orally for 1 wk.; traction and cervical collar	None	Good relief of pain and muscle spasm in 3 or 4 days; returned to work in 1 wk.; patient very enthusiastic about drug which gave her more relief than mephenesin or meprobamate
29	F	9/15/56	Old slipped capital femoral epiphysis; postoperative replacement–arthroplasty with femoral head prosthesis; adductor muscle spasm and leg cramps at night	3 to 4 per day, orally, for 2 wk.	None on 0.5 Gm. every 4 hr.; some dizziness and lightheadedness on 1 Gm.	Marked relief of night cramps and adductor muscle spasm
34	M	10/11/56	Recurrent cervical dorsal myositis and fibrositis; previous temporary relief from procaine injection at trigger points	6 per day, orally, for 4 days	None	Attack subsided in 2 days; patient very enthusiastic
44	F	9/1/56	3 yr. postoperative femoral head prosthesis for comminuted fracture of head of femur; moderate pain and spasm about hip	6 per day, orally, for 3 wk., then off 10 days and back on for 10 days; followed by adductor tenotomy and tensor fascia lata release	None	Fair relief of spasm and pain; she first thought it didn't help but was worse when not receiving it, so therapy was started again
60	M	10/12/56	Thoracic spondylosis with early osteophyte formation; fatigue and pain in thoracic spine with standing or leaning forward; pain in early morning	4 to 6 per day, orally, for 1 wk., and then as needed	None	Excellent relief in 3 to 4 days
28	F	1/2/57	Probable old tear or strain of ligamentum nuchae at C-7 spinous process; pain and tenderness at spine of C-7 for 6 mo., since mild flexion injury; x-rays negative, including flexion and extension views	4 to 6 per day, orally, for 10 days	None	Practically complete relief of pain and tenderness when seen after 2 wks.
66	F	11/20/56	4 mo. postoperative femoral head prosthesis for subcapital fracture of right hip; she did well at first but gradually developed sudden, severe, catching pains and spasm about her hip; x-rays negatives; had to stop walking	0.5 every 4 hr. for about 3 wk.	None	Comfortable since third day on medication; no pain or spasm; getting about well on walker again
64	M	2/6/57	2 days postoperative subtrochanteric osteotomy left hip; severe pain and muscle spasm; unable to rest or be moved in bed without severe pain	4 per day for 11 days, orally, starting on second postoperative day	None	Pain and spasm were relieved to a large degree within a few hours and he required no more narcotics after that night
45	M	1/21/57	Acute torticollis underlying cervical arthritis and possible herniated disk; severe spasm and limited motion	0.5 intravenously and then 4 per day, orally, for 5 days	None	Marked relief of pain and spasm, and increased motion in neck within 5 min.
30	M	8/15/57	Acute torticollis with severe muscle spasm; no injury; no neurological changes	6 per day, orally, for 3 to 4 days	None	Complete relief the 1st day so stopped drug and torticollis returned; took drug 3 days and obtained complete relief
41	M	1/15/57	Postoperative arthrotomy right knee for torn meniscus and loose body; severe pain and spasm	4 per day, orally, for 6 days; starting day after operation	None	Good relief of pain and muscle spasm in 24 hr.; stopped narcotics on second day
40	M	2/15/57	3 days postoperative bone graft to humerus for nonunion; pain and muscle spasm	6 per day, orally, for 9 days	None	Noticeable relief of pain and muscle spasm
46	F	6/8/57	Whiplash injury of cervical spine; x-rays negative; pain in neck and occipital headache	4 to 6 per day, orally, for 1 mo.; cervical collar	None	Methocarbamol controlled her pain and spasm very well during first month; almost complete recovery in 2 mo.
37	F	5/16/57	Myositis and fibrositis; pain at base of neck, upper dorsal region, and both shoulder girdles; worse late in the day, early part of the night, or in bad weather	1 every 4 hr. or just at bedtime, as needed	None	Helped with pain and soreness so she could relax and go to sleep at night
25	M	5/31/57	One day postoperative laminectomy for herniated lumbar disk; methocarbamol given for pain and spasm	6 per day, orally, for 1 wk.	None	Much more comfortable as soon as the drug was started; got up on the 3rd day, went home in 1 wk.
53	F	1/20/57	Bilateral Colles fractures and compression fractures of spine; generalized muscle soreness and stiffness	4 per day, orally, for 10 days; started 3 days after accident	None	More comfortable; helped relieve her stiffness and sore muscles
32	M	1/3/57	Acute low back pain; possible herniated lumbar disk; tenderness and spasm in lumbar muscles	6 per day for 5 days	None	Attack subsided in about 4 days
30	F	12/29/56	Auto accident with severe contusion of shoulder and costochondral separations; severe pain and spasm with movement and respiration	6 per day for 10 days; application of rib splint	None	Prompt relief of pain in ribs and shoulder
43	F	3/18/57	Severe whiplash injury of cervical spine; x-rays negative; neurological negative; headache and pain in cervical and upper thoracic spine	Started on day of injury–6 per day, orally, for 10 days; then 1 every 4 hr. as needed	None	Unusually rapid recovery from a severe whiplash injury; neck gave very little pain after 10 days and headache was better; incidentally reported she had no menstrual cramps for first time in years
43	M	5/21/57	Acute low back strain and contusion	6 per day, orally, for 1 wk.; rest and heat	None	Drug seemed to help him get over soreness and he returned to work
45	M	1/10/57	Old thoracolumbar scoliosis; chronic muscle and ligamentous strain, with pain for past 6 mo.	4 to 6 per day, orally, for 1 wk., then as needed	None	Pain relieved within a week and no recurrence when seen 4 mo. later
42	F	8/5/57	3 days postoperative laminectomy for spondylolisthesis; severe pain and spasm	5 per day, orally, for 2 wk.	None	Moderate relief of pain and spasm

and in postoperative cases to combat painful muscle spasm. In fracture and accident cases the drug relieved spasm and muscle soreness and enabled these patients to move about and become ambulatory sooner, generally with less use of narcotics.

Its effectiveness in more chronic cases, such as spondylitis, myositis, and fibrositis, was gratifying; relief of nighttime leg cramps was noted in several patients.

Intravenously given methocarbamol is a safe and very effective muscle relaxant. It has proved beneficial in the reduction of dislocated shoulders without anesthesia and in the manipulation of a spastic flatfoot.

The methocarbamol used in this study was supplied as Robaxin by the Department of Clinical Research, A. H. Robins Company, Inc., Richmond, Va.

References

1. Murphey, R. S., Research Laboratories, A. H. Robins Company, Inc., Richmond, Va.
2. Truitt, E. B., Jr.; Patterson, R. B.; Morgan, A. M.; and Little, J. M.: Blood Levels and Hemolytic Indices of New Interneuronal Depressant, Methocarbamol, and Related Compounds, abstracted, J. Pharmacol. & Exper. Therap. **119**:189 (Feb.) 1957. Morgan, A. M.; Truitt, E. B., Jr.; and Little, J. M.: Plasma Levels of Mephenesin, Mephenesin Carbamate, Guaiacol Glyceryl Ether, and Methocarbamol (AHR-85) After Oral and Intravenous Administration in Dog, J. Am. Pharm. A. Scient. Ed. **46**:374-377 (June) 1957. Truitt, E. B., Jr., and Little, J. M.: Pharmacologic Comparison of Methocarbamol (AHR-85), the Monocarbamate of 3-(o-Methoxyphenoxy)-1,2-Propanediol with Chemically Related Interneuronal Depressant Drugs, J. Pharmacol. & Exper. Therap., to be published.
3. Carpenter, E. B.: Personal communication to the author.
4. Rebman, J., and Pembleton, W. E.: Personal communication to the author.

CLINICAL RESULTS WITH METHOCARBAMOL, A NEW INTERNEURONAL BLOCKING AGENT

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Methocarbamol was administered to approximately 110 patients with various forms of neuromuscular disease marked by involuntary muscular activity. Given intravenously, the drug caused significant reduction of both involuntary tonic and clonic contractions in 30 patients whose symptoms were ascribed to lesions of the pyramidal tracts or to acute myalgic disorders. If relief was obtained, it appeared within 30 to 45 minutes. The results were sufficiently striking to warrant more thorough investigation.

In all fields of medicine concerned with the management of long-term disabling conditions, perhaps the most trying disorders to control are those related to involuntary increase in muscle tone. From the viewpoint of a physiatrist closely affiliated with rehabilitation center activities, the disorders involving pyramidal tract function are only temporarily ameliorated by physical treatment. Through bracing, strengthening of residual function, regaining available range of motion, and training in substitute methods, it is stimulating to see what can be accomplished with individual patients. In selected cases surgical procedures of many types may be advantageous. Joint stabilization, selected neurectomies, alteration of tendinous arrangement about moving parts, and changing muscle function from polyarticular to monoarticular action may be done to attain better function. However, whether medical and/or surgical procedures are undertaken, the basic problem of spasticity remains unabated. Therefore, the search for effective methods to control spasticity and muscle spasm continues. This is a report of observations made on a clinical screening trial of a new interneuronal blocking agent, methocarbamol (Robaxin).

Pharmacology of Methocarbamol

Guaiacol glyceryl ether, a short-acting skeletal muscle relaxant,[1] is the parent compound from which methocarbamol is derived. Chemically, methocarbamol is 3-(o-methoxyphenoxy)-2-hydroxypropyl-1-carbamate. Truitt [2] performed the pharmacodynamic studies with methocarbamol and suggested that the prolonged relaxing effect on voluntary muscle produced by this compound indicated its clinical use. In these studies he demonstrated that methocarbamol acts at the level of the spinal cord, through a depression of the multisynaptic pathways, with no effect on the monosynaptic reflexes. It was demonstrated by Solomon,[3] in studies on isolated nerve muscle preparation and rats with the cervical cord transected, that methocarbamol had no activity upon the motor nerves, muscles, myoneural junction, or monosynaptic arcs. The protective action of this compound against

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pentylenetetrazol and electroshock convulsions and a prolongation of the hexobarbital sodium–induced sleeping time in mice [4] suggested a supraspinal locus of action for this compound. Thus, the marked and prolonged skeletal muscle relaxing properties and wide range of safety with methocarbamol recommended its application clinically in disease states manifesting skeletal muscle hyperactivity.

Case Selection and Method of Study

From Jan. 2 to Oct. 11, 1957, approximately 150 patients with involuntary increase in muscle tone were treated with methocarbamol by the department of physical medicine and rehabilitation. Of the entire group, there were 42 patients, with a variety of conditions, in whom the signs and symptoms were stabilized. The addition of the medication was the only change in the treatment program. These patients were selected for close observation of the clinical effect of methocarbamol.

In all patients included in this study a complete examination was done prior to starting the medication. Strength, range of motion, intensity of simple and complex reflexes, abnormality of motion, pain, degree of muscle spasm, and other related findings were assessed clinically and recorded. Periodic follow-up examinations were done after medication was started and after medication was discontinued. The therapeutic effect of methocarbamol was graded in three categories: (1) significant measurable response on gross physical examination, (2) questionable response, and (3) no significant response.

The range in ages of the study group was 4 to 72 years with 27 persons in the 25 to 55 year range. Four patients were treated at institutions other than the Medical College of Virginia Hospitals, for demonstration purposes. In two of these demonstration cases the patients were treated only one day with medication given intravenously. Ten patients were observed during admission to the Medical College of Virginia Hospitals. The remaining 28 were followed on an outpatient basis. Motion picture recordings were made in three instances.

Results

The therapeutic effect of methocarbamol and the untoward side-effects are summarized in the table.

Spinal Cord Injury with Residual Spasticity.—In the group of patients with spinal cord injury and residual spasticity were three persons with demonstrated complete traumatic transection of the cord. The remainder had partial lesions. The level of cord injury ranged from the fifth cervical vertebra to the sacral cord area. All had overt evidence of spasticity. The end-results of treatment differed in the completely and partially involved groups. Characteristic examples are as follows:

Case 1.—A 28-year-old man, in November, 1956, was in a noncollision automobile accident and sustained a fracture-dislocation at the level of the fifth and sixth cervical vertebrae. Decompression operation was done within 48 hours of injury because of complete spinal fluid block. At operation the patient was found to have extensive maceration of the spinal cord at the level of bony injury.

Clinical Response to Methocarbamol in Various Types of Disorders

Disease Category	Cases, No.	Duration of Treatment, days	Total Dose per Day, Gm.	Medicament Used Intravenously	Clinical Response: Significant	Clinical Response: Questionable	Clinical Response: None	Side-effects: Patients, No.	Side-effects: Symptoms
Spinal cord injury with residual spasticity	11	14-135	8 -10	3	10	0	1	2	Transient "fuzzy" vision (with intravenous medication) in 1; drowsiness in 1
Encephalomyelopathy with residual spasticity	4	1-120	0.5- 8	2	4	0	0	0	...
Cerebrovascular accident with residual spastic hemiplegia	5	3- 60	5 - 8	0	5	0	0	2	Dizziness in 1; headache in 1; drowsiness in 2
Multiple sclerosis (chronic)	2	14- 30	3 - 8	1	2	0	0	2	Drowsiness in 1; easy fatigability in 2; increasing unsteadiness of gait in 2
Acute myalgia (idiopathic)	3	7- 14	8	3	3	0	0	1	Transient nausea (with intravenous medication)
Cerebral palsy, spastic paraplegic type	5	30-120	4 - 8	0	3	2	0	0	...
Cerebral palsy, rotary athetoid type	2	14- 30	6 - 8	0	0	0	2	1	Drowsiness
Chronic arthritic and myalgic disorders with pain and muscle spasm	10	3- 30	4 - 8	0	0	0	10	1	Dull headache; inability to concentrate

Repeat examination on March 9, 1957, revealed spastic quadriplegia consistent with complete cord damage at the level of the fifth and sixth cervical vertebrae. The patient had frequent forceful involuntary movements of the lower extremities and trunk. This interfered with sleep, and side-rails had to be placed on the bed to prevent his falling out. All tendon jerks were very brisk. He had sustained ankle, knee, and wrist clonus. The shoulder joints were very tight and painful. The elbows could not be extended beyond 90 degrees because of spasm in the biceps. The heel cords were very tight. The patient was started on therapy with methocarbamol, 2.0 Gm. given orally four times daily, on March 9, 1957. On the first night he slept better than usual, and on the second night he slept the entire night without being awakened by involuntary movement.

On March 14, involuntary movement could be demonstrated only with intense stimuli (i. e., shaking the bed or forceful testing for the Babinski response). The wrist and ankle clonus were reduced to three or four sluggish repetitions, and the elbow joints could be stretched to within 15 degrees of full extension. The isolated tendon jerks remained very brisk.

The physical findings on April 10 were the same as reported on March 14. The medication was discontinued because the supply ran out. It was decided to observe the effect.

Reexamination on April 16 revealed essentially the same findings as observed on March 9. Methocarbamol therapy was resumed on April 21 with good relief of spasticity

within 48 hours. The effect continued until the patient's discharge to another hospital on May 15. No side-effects were observed.

CASE 2.—A 44-year-old man was admitted to the hospital in September, 1956, with a history of insidious loss of voluntary control of the right lower extremity for two years and mild weakness in the left calf for six months. Exploratory operation done on admission revealed hemangioma of the low lumbar and sacral area of the spinal cord. Coagulation and resection were done.

After the operation the patient had total loss of voluntary function in the pelvic girdle and lower extremities and bladder and bowel incontinence. About two weeks after the operation he began developing signs of spasticity, and by the eighth week the spasticity was severe. About the eighth week early voluntary hip flexion and knee extension could be identified. The patient was fitted with drop foot braces, and he became ambulatory with corset, braces, and crutches.

The principal problems observed on Feb. 2, 1957, were (1) severe tightness in heel cords (1-in. heel lifts were needed); (2) continual severe sustained ankle clonus with weight bearing; (3) weakness in gluteal muscles, bilaterally; and (4) inability to walk without braces. When the patient was in a standing position without braces, the ankles assumed a marked talipes equinovarus position. The patient was given 1 Gm. of methocarbamol intravenously over a 12-minute period. About five minutes after the medication was started, he developed "fuzziness of vision" which cleared completely before the full dose was given.

Within 30 minutes after administration of the medication, the sustained clonus was converted to unsustained clonus with only three to four repetitions. The patient was unable to walk in stocking feet with crutches. The ankle and knee jerks continued to be very brisk. He was started on therapy with methocarbamol, 2 Gm. given orally four times daily.

On reevaluation on Feb. 22, the patient could walk rapidly with crutches and brace, without clonus being evident in the gait. The left ankle could be dorsiflexed past neutral position by 10 degrees and the right ankle to neutral position. There was an unsustained clonus with five to seven repetitions.

Reexamination on March 23 revealed further improvement in passive range of ankle motion; otherwise there was no change. All medication was discontinued.

On April 16 it was found that the patient had retained his improved functional level after use of methocarbamol was discontinued. A report by letter in July, 1957, indicated that there was no return of clonus with weight bearing. The transient visual symptom was the only side-effect noted.

All patients with complete cord lesions had return of severe spasticity and complex involuntary movement when the medication was discontinued. The patients with partial damage retained improved functional ability and suppression of mass reflex patterns after use of methocarbamol was terminated.

Encephalomyelopathy with Residual Spasticity.—In the group of patients with encephalomyelopathy with residual spasticity were two patients with tuberculous meningitis, one with influenzal meningitis, and one with residual spasticity after prolonged cardiac arrest. All patients had original onset of the primary disease more than 12 months prior to the study, and disorders had cleared, by clinical standards. All had severe generalized spasticity. An example of the observations in this type of case follows:

CASE 3.—A 27-year-old man (demonstration case) was admitted to the hospital in September, 1955, in coma and with high fever and severe generalized muscular weakness. Examination of the spinal fluid revealed the presence of acid-fast organisms on culture. The primary disease was brought under control in four months, but the patient continued to have severe residual spasticity. When examined on Aug. 15, 1957, he had very brisk tendon jerks and sustained ankle and knee clonus. With crutches and braces he was able to walk 15 to 20 feet. The gait was awkward and stiff. He could not walk without braces because of talipes equinovarus of ankles and sustained clonus.

The patient was given 0.5 Gm. of methocarbamol intravenously over a 10-minute period. Within 20 minutes after termination of medication, the clonus was converted to unsustained level. The patient walked in stocking feet with crutches for 25 feet without fatigue. With the braces, the gait was much smoother and he walked for about 100 feet without fatigue.

No oral medication was started. When seen on Sept. 19, 1957, the patient had retained ability to walk for long distances without fatigue, but he could not walk without braces.

Cerebrovascular Accident with Residual Spastic Hemiplegia.—The patients with hemiplegia had paralysis for longer than nine months. With medication, all demonstrated clear reduction in degree of spasticity on the involved side. As in the patients with partial paraplegia, improved function was retained after the medication was discontinued.

Multiple Sclerosis.—Both of the patients who had multiple sclerosis had endured the disease for longer than 10 years. The defect in gait had been unchanged for more than one year. The medication caused suppression of mass reflex activity, but because of increasing unsteadiness in gait the medication was discontinued. No change was observed in the actual muscle strength in either case.

Acute Myalgia.—In the group of patients with acute myalgia, there were two with severe pain and muscle spasm in the lumbar region and with inability to stand erect (one case of two days' and the other of eight days' duration). One patient had acute torticollis for 48 hours. Trauma was not associated with onset, and there was no neurological deficit. All patients were given medication intravenously, with doses ranging from 0.5 to 1.0 Gm. Orally given medication was instituted three hours later, at 2 Gm. four times daily. No objective change was noted immediately after the intravenously given medication, although each patient reported subjective improvement. Recovery of nearly full range of motion was observed in 12 to 18 hours, and all muscle spasm cleared in three to seven days.

Cerebral Palsy.—Seven patients with well-defined types of cerebral palsy were chosen for observation. In three patients with spasticity, it was clearly evident that over-all muscle tone was significantly lessened, i. e., the knee joint of the brace could be locked with reasonable ease, where for years it had been a difficult process. The mass reflexes were decreased. No objective change was noted in the patient with athetosis.

Chronic Arthritic and Myalgic Disorders with Pain and Muscle Spasm.—The group of patients with chronic arthritic and myalgic disorders with

pain and muscle spasm included one with severe active rheumatoid arthritis, two with degenerative arthritis, four with chronic fibromyositis (for longer than 12 months), and three with residual weakness following poliomyelitis who were subject to recurrent skeletal muscle cramps.

The patient with rheumatoid arthritis had been known in the arthritis clinic for more than two years. During that time he had had a constant high degree of disease activity. He was admitted to the hospital. For two weeks physical therapy and medication for arthritis were kept at a constant level. Activity of the disease remained stable. During the two-week period in which methocarbamol was added to the treatment program, no change was observed.

Both of the patients with degenerative arthritis were elderly females with characteristic findings of this disorder. One had involvement of the knees and the other of one hip. They were taking no medicament when first examined. No spontaneous relief of symptoms or increase in motion was noted during the period of methocarbamol therapy. Salicylates and physical therapy afforded relief during the ensuing treatment period. No objective changes were noted in the patients with chronic painful fibromyositis or in the patients with recurrent muscular cramps following poliomyelitis.

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Side-Effects

No irreversible side-effects or toxic effects have been noted in the 150 patients treated with methocarbamol. In two cases the medication was discontinued because of undesirable side-effects. One patient with hemiplegia and mild aphasia developed dizziness and drowsiness within 15 minutes after 1.5 Gm. of methocarbamol had been given. This persisted for three days at a very aggravating level, and medication was discontinued. About three months later the patient was started on graduated doses without any side-effects. The other patient had recurrent muscular cramps following bulbospinal poliomyelitis. He worked as a time and payroll clerk. About 30 minutes after taking 1.5 Gm. of methocarbamol, he found it difficult to add the payroll. He also complained of a "hangover" type of dull headache. The medication was discontinued in three days.

Two patients noted side-effects when given medication intravenously. One patient had transient "fuzzy" vision. This cleared before the full dose had been given. The other patient had transient nausea, which cleared spontaneously in about 30 minutes after administration of methocarbamol.

In both patients with multiple sclerosis, use of the drug was ultimately discontinued because of the easy fatigability and observable evidence of increasing unsteadiness in gait. The medication appeared to have a laudable objective neurological effect without impairment in strength. Because of the subjective complaints, it was thought advisable to stop the medication.

In all other patients the side-effects were relieved by slight reduction of the dosage. No side-effects developed after 72 hours on the medication.

Comment

All patients who had a demonstrable significant response to the medication attained the effect within 30 to 45 minutes after intravenous induction or within 72 hours on oral medication. In no instance was there any significant reduction in voluntary strength or intensity of simple reflexes. For the period of this study, no patient developed an attenuating effect to the medication.

Of the 27 patients with residual spasticity following disorders involving the pyramidal tracts, only three failed to show significant clinical response on gross physical examination. The characteristic result was suppression of complex reflex activity and bizarre involuntary movement. In no instance was there decrease in intensity of simple reflex responses or voluntary muscular strength. No objective response to treatment was noted in patients with muscle spasm resulting from joint disease, primary disease of muscle, extrapyramidal conditions, or anterior-horn-cell disorders. This appears to confirm the findings of Truitt and Solomon that methocarbamol acts to suppress multisynaptic neuronal pathways and has no significant activity on the motor nerves, muscles, myoneural junction, or monosynaptic arcs.

It is particularly interesting that a salutary effect of this drug was observed in patients with acute low back pain and acute torticollis. It is generally considered that these disorders are the result of strain or tear in ligamentous or muscular structures. Since methocarbamol appears to have no activity on primary reflex muscle spasm, is it not reasonable to assume that idiopathic myalgia is the result of an increase in the excitatory state at the internuncial pool level?

The side-effects reported in the table are not considered to be toxic effects of this drug. Instead, the symptoms, such as drowsiness, difficulty in concentration, and "fuzzy" vision, suggest that methocarbamol has a secondary supraspinal focus of action.[2] These central effects did not interfere with the use of the drug.

Summary and Conclusions

Methocarbamol (Robaxin) was evaluated in 42 patients with a variety of disorders manifesting an increase in involuntary muscle tone. In 30 patients with pyramidal tract and acute myalgic disorders, use of this drug resulted in a significant improvement in 27 (90%), questionable improvement in 2, and none in 1. There was no change in 12 patients with chronic arthritic, extrapyramidal, and myalgic disorders, as a result of drug administration. In all but two patients the side-effects were reversed on

slight reduction of dosage. No side-effects developed after 72 hours on the medication. Methocarbamol has a sufficiently prolonged action so that the functional capabilities of patients with pyramidal tract disease have been significantly improved. The results of these trials warrant further study of this type of medication.

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The methocarbamol used in this study was furnished as Robaxin through Jack Freund, M.D., Associate Director of Clinical Research, A. H. Robins Company, Inc., Richmond, Va.

References

1. Ginzel, K. H.: Vergleichende Untersuchung einiger antikonvulsiv wirksamer Glyzerinäther, Arch. exper. Path. u. Pharmakol. **212**:331-338, 1951. Ginzel, K. H.; Leupold-Löwenthal, H.; and Weis, W.: Über Tierversuche mit Myocain, Wien. med. Wschr. **99**:299-300 (June 25) 1949.
2. Truitt, E. B., Jr., and Little, J. M.: Pharmacologic Comparison of Methocarbamol (AHR-85), Monocarbamate of 3-(o-Methoxyphenoxy)-1,2-propanediol with Chemically Related Interneuronal Depressant Drugs, J. Pharmacol. & Exper. Therap., to be published.
3. Solomon, S.: Personal communication to the author.
4. Hazleton Laboratories, Falls Church, Va.: Unpublished data.

RELIABILITY OF TUBELESS GASTRIC ANALYSIS IN PRESENCE OF COMPLICATING DISEASES

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Two methods for detecting gastric achlorhydria, the conventional and the tubeless methods, were compared in a study of 114 hospital patients. Each patient had a disease that might be expected to interfere with the physiological mechanisms involved in the tubeless method. The fasting patients received 1.0 mg. of histamine phosphate subcutaneously to stimulate gastric secretion. After 45 minutes a urine specimen was obtained and a sample of gastric juice was removed for the conventional titration with dimethylaminoazobenzene (Töpfer's reagent) as indicator. The patient then received 2 Gm. of a cation exchange resin (containing 90 mg. of azure A) with 240 ml. of water. Two hours later a second urine specimen was obtained for comparison with the first. Appearance of the dye in the second urine specimen, indicating the presence of free acid in the stomach, was correlated with the amount of acid disclosed by titration. Discrepancies between the results of the tube and the tubeless methods were found in 12 patients, 7 of whom had renal disease. In 102 patients the results of the two tests agreed. The simplicity of the tubeless method recommends it for use as an office procedure and in screening large numbers of patients.

The desirability of a technique for determining gastric acidity without intubation has long been recognized by physicians and patients. In 1950 Segal [1] described a procedure using a cation exchange resin in which the hydrogen ions had been replaced with a quinine compound. At pH 3.8 or lower the quinine was released, absorbed from the small intestine, and excreted by the kidneys. Its presence in the urine could be detected by its characteristic fluorescence. In the absence of free gastric acid no quinine was liberated from the resin compound in the stomach. Several workers confirmed Segal's findings of close agreement with intubation techniques.[2] The procedure, however, did not receive wide acceptance for two reasons: 1. Care was needed to prevent the ingestion, for several days before the test, of vitamins and other medicaments whose excretory products were fluorescent. 2. The technique of quinine extraction was time consuming and tedious.

In 1953, Segal, Miller, and Plumb [3] modified the procedure by substituting the thionine dye, azure A, for the quinine in the cation exchange resin. The dye could be detected in the urine by its blue color. Medicaments did not interfere, and no time-consuming extraction process was necessary. In vitro tests showed that release of azure A began at pH 3.2 and was maximal at pH 1.5. Close agree-

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ment with gastric acidity determinations by the intubation and quinine resin techniques was demonstrated.[4]

The chief limitation of tubeless gastric analysis is its lack of quantitative value. In the absence of free gastric acid, azure A is not excreted in the urine in a significant quantity within the test period. In the presence of free acid, the quantity of dye excreted does not correlate with the amount of acid measured by the standard titration technique. When quantitative data are desired, intubation is necessary.

The tubeless gastric analysis will probably find its place in clinical medicine as a screening device for the detection of gastric achlorhydria. The early detection of gastric malignancy is oriented to the careful surveillance of patients with premalignant lesions. Gastric achlorhydria is the most commonly recognized entity in which there is an increased incidence of gastric malignancy.[5] The careful scrutiny of asymptomatic achlorhydric individuals has been reported to yield an incidence of 1% gastric carcinoma.[6] Because of its simplicity and low incidence of false-negative results, tubeless gastric analysis is well suited for screening purposes.

Little is known of the fate of azure A following its absorption from the gastrointestinal tract. The literature stresses the potential unreliability of the test in the presence of liver disease, heart failure, kidney disease, intestinal malabsorption, pyloric obstruction, and urinary retention due to obstructive uropathy. The effect of the last two conditions seems obvious. In the absence of more precise information about the metabolism of azure A, the effect of the first four conditions does not seem so obvious. Since this test is likely to be used predominantly in the older age group in whom heart, kidney, and liver diseases are common, it appears desirable to obtain more information regarding the reliability of tubeless gastric analysis in the presence of such complicating diseases. The study here reported was designed to gain such information.

Methods and Results

One hundred fourteen patients hospitalized in the Philadelphia Veterans Administration Hospital were studied for the presence of free gastric acid by the intubation method with Töpfer's reagent and immediately thereafter by the tubeless gastric analysis technique using a cation exchange resin azure A compound. The patients in this study were selected because each had a disease state in which the results of the tubeless gastric analysis might be questioned. The patients were divided into the following five categories for purposes of analysis: (1) liver disease, (2) heart disease, (3) kidney disease, (4) diseases of the gastrointestinal tract, and (5) miscellaneous diseases.

In the fasting state the patient was given 1.0 mg. of histamine phosphate subcutaneously as a stimulant to gastric secretion. Forty-five minutes later a control urine specimen was obtained. A no. 18 Levin tube was then passed into the stomach and the contents aspirated and tested for the presence of free hydrochloric acid using Töpfer's reagent as an indicator. The tube was removed and the patient given 2 Gm. of the cation exchange resin azure A compound (containing 90 mg. of azure A) with 240 ml. of water. The urine voided during the two hours following the ingestion of the resin compound was collected as the test urine. This two-hour urine was diluted to a volume of 300 cc. and an aliquot compared with two color standards of azure A, one equivalent to 0.3 mg. of azure A per 300 cc. and the second equivalent to 0.6 mg. of azure A per 300 cc. The control urine collected prior to the ingestion of the resin compound was used as a filter for the color standards to correct for the presence of urinary pigments.

If the color of the test urine was more intense than that of the 600-mg. standard, the test was interpreted as indicating the presence of free gastric acid. If the color was less intense than that of the 600-mg. standard, the aliquot of urine was acidified with 1 drop of 18% hydrochloric acid, placed in a boiling water bath for 15 minutes, and then cooled to room temperature for three hours. This step was designed to convert the colorless form of the dye to its colored form. The urine was again compared with the color standards. If the color was more intense than the 600-mg. standard, the presence of free acid was inferred; if less intense than the 300-mg. standard, the test was interpreted as indicating no free gastric acid; if between the 300-mg. and 600-mg. standards, the test was interpreted as doubtful.

The results of the tube and tubeless determinations are tabulated in table 1. Discrepancies between the two methods are reported in table 2.

Comment

Evidence has accumulated which confirms the soundness of the premise of tubeless gastric analysis, that is, the release in the stomach at pH 3 or lower of a substance which will be absorbed from the small intestine and excreted by the kidney in detectable form. The validity of the test depends upon other factors as well. The conventional gastric analysis, though frequently uncomfortable for both patient and technician, does not require the functional integrity of any other organ. The tubeless gastric analysis, however, assumes normal gastric emptying, standard absorption from the small intestine, uniform circulatory dynamics in transport

of the dye, consistent handling by liver and other organs, prompt excretion by the kidney, and complete emptying of the bladder.

Complete plyoric obstruction would preclude absorption of the dye from the small intestine. In the few cases of partial pyloric obstruction that we studied, enough dye entered the small intestine so that no false-negative results were obtained. In

TABLE 1.—*Results of Tube and Tubeless Gastric Analyses in Various Conditions*

Disease Present	Patients, No.	Free Acid Present			No Free Acid Present		
		Tube	Tubeless	Discrepancy	Tube	Tubeless	Discrepancy
Liver (39)							
Laennec's cirrhosis	24						
Acute hepatitis	6						
Common duct stone	3						
Hemochromatosis	2						
Hodgkin's disease	2						
Carcinomatosis	1						
Pancreatic carcinoma and obstructive jaundice	1						
		36	35	1	3	2	1
Kidney (26)							
Nephrosclerosis	16						
Chronic glomerulonephritis	7						
Diabetic glomerulosclerosis	4						
Chronic pyelonephritis	2						
Multiple myeloma	2						
Disseminated lupus erythematosis	1						
		20	13	7	6	6	0
Heart (26)							
Arteriosclerotic	15						
Rheumatic	8						
Cor pulmonale	2						
Myocarditis	1						
		20	20	0	5	3	2
Gastrointestinal (13)							
Duodenal ulcer—pyloric obstruction	3						
Gastric ulcer—pyloric obstruction	3						
Gastric carcinoma—pyloric obstruction	2						
Duodenal ulcer	2						
Duodenal ulcer—postsubtotal gastrectomy	1						
Benign pyloric obstruction	1						
Regional enteritis	1						
		12	12	0	1	1	0
Miscellaneous (10)							
Pernicious anemia	4						
Macrocytic anemia, unknown type	1						
Multiple sclerosis	1						
Myxedema	1						
Malnutrition	1						
Sarcoidosis	1						
Diabetes mellitus	1						
		3	3	0	7	6	1
Total	114	91	83	8	22	18	4

patients previously subjected to gastrectomy, the resin compound may not be retained in the gastric stump long enough to permit release of the dye. Shay[7] has reported an occasional false-negative result in a patient who has undergone gastrectomy. Segal feels that keeping the patient supine or on his left side for 15 minutes after the ingestion of the resin would obviate this objection. There is a theoretical possibility that hypermotility might produce the same problem. The incidence of false-negative results reported in a series of ulcer patients, in whom hypermotility might be expected, is so low that this must rarely occur.

To the best of our knowledge, the test has not been performed in a significant number of patients with the malabsorption syndrome. Our one patient with regional enteritis absorbed enough dye to give a true positive test. In our group of 26 patients with heart disease, all of whom were in congestive failure, no false-negative results were obtained. The renal blood flow is apparently adequate for excretion of sufficient quantities of azure A.

The role of the liver in the handling of azure A is unknown. In our group of 39 patients with vary-

TABLE 2.—*Summary of Discrepancies Between Tube and Tubeless Gastric Analysis in Twelve Patients*

Diagnosis	Blood Urea Nitrogen, Mg./100 Ml.	Miscellaneous Data	Result, Tube Method	Result, Tubeless Method
Laennec's cirrhosis	...	Sulfobromophthalein, 40%; bilirubin, 5.6 mg./ml.; cephalin flocculation, ++++	+	—
Metastatic carcinoma of liver	...	Sulfobromophthalein, 40%; bilirubin, 10.8 mg./ml.; alkaline phosphatase, 48 Shinowara units*	—	+
Glomerulonephritis	60	...	+	—
Glomerulonephritis	84	...	+	—
Glomerulonephritis	120	...	+	—
Nephrosclerosis	180	...	+	—
Diabetic glomerulosclerosis	114	...	+	—
Diabetic glomerulosclerosis	80	...	+	—
Chronic pyelonephritis	118	...	+	—
Rheumatic heart disease	...	...	—	+
Arteriosclerotic heart disease	...	...	—	+
Macrocytic anemia (unknown type)	...	...	—	+

* Shinowara and others (*J. Biol. Chem.* **142**:921, 1942).

ing degrees of hepatic failure, one false-negative result was obtained. This occurred in a patient with far-advanced hepatic cirrhosis with evidence of both chronic and acute hepatocellular damage. Several of the patients were markedly icteric at the time of the test. Others had laboratory and clinical evidence of severe hepatic insufficiency and impending coma.

Far-advanced renal disease was the one condition in which we found a significant incidence of false-negative results. In the presence of severe renal insufficiency, an inadequate amount of the dye is excreted. In our group of 26 patients there were seven false-negative results, an incidence of 27%. These occurred in patients whose blood urea nitrogen level was more than 60 mg. per 100 ml. In patients with moderately severe renal disease whose blood urea nitrogen was less than 60 mg. per 100 ml., the results of the tubeless gastric

analysis were in agreement with those of the aspirated gastric specimen. The presence of urinary retention due to obstruction at the vesical neck or elsewhere makes the test unreliable unless catheter emptying of the bladder is employed.

Recently Poliner, Hayes, and Spiro [8] reported an incidence of 75% false-negative results. This contrasts sharply with the low incidence in our group. In 42 patients in whom there were negative or doubtful results by tubeless gastric analysis, Poliner and his group found that 26 had free acid when tested by intubation following histamine stimulation. The authors point out that this high incidence of false-negative results may have occurred because 500 mg. of caffeine sodium benzoate was used as the gastric stimulant for the tubeless analysis, whereas histamine, a more potent stimulant, was used for the conventional analysis. The tubeless and tube studies were also done on different days. In our study in which the determinations were done simultaneously following histamine stimulation, no such discrepancy was noted.

In the 114 patients studied, there were 4 in whom the results could be called false-positive, that is, in whom the tubeless gastric analysis indicated free acid when the gastric aspirate showed no free acid. This incidence of 3.5% false-positives is in close agreement with other reports.

The procedure itself, including testing the urine, is simple and requires little time or training. In our group of 114 patients, 63, or 55%, gave positive results as indicated by dilution of the urine. In the cases of the remaining 51 patients (45%) acidification and heating was required.

Summary and Conclusions

Tubeless gastric analysis has been shown to be a valid procedure for determining the presence of free acid in the stomach. It gives no quantitative data, however, regarding the amount of acid secreted.

One hundred fourteen patients with diseases that might invalidate the results of tubeless gastric analysis were studied with conventional intubation and the tubeless method following histamine stimulation. Seven false-negative results were obtained among 26 patients with renal disease. In these seven patients the blood urea nitrogen level was in excess of 60 mg. per 100 ml. In a group of 39 patients with hepatic disease, one false-negative result was obtained in a patient with far-advanced cirrhosis. The tubeless gastric analysis technique appears to be valid in the presence of heart disease, miscellaneous other diseases, and early to moderately severe liver and kidney disease.

Tubeless gastric analysis will probably be most useful as a screening technique for the detection of gastric achlorhydria. Its simplicity makes it readily adaptable for use in large numbers and as an office procedure.

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The cation exchange resin azure A compound used in this study was supplied as Diagnex Blue with translucent color standards by Dr. Henry A. Strade of the Squibb Institute, New Brunswick, N. J.

References

1. Segal, H. L.; Miller, L. L.; Morton, J. J.; and Young, H. Y.: Use of Cation Exchange Indicator Compounds to Determine Gastric Acidity Without Intubation, Gastroenterology **16**:380-386 (Oct.) 1950.

2. Gilbert, S. S., and Matzner, M. J.: Gastric Analysis Without Intubation, Am. J. Gastroenterol. **24**:543-552 (Nov.) 1955. Behr, G., and Lawrie, H.: Controlled Tubeless Test Meals, Gastroenterology **28**:409-411 (March) 1955. Sharp, G. S.; Hazlet, J. W.; and Shankman, S.: Gastric Analysis Without Intubation, Cancer **7**:289-290 (March) 1954. Becker, F. P., and Maslon, M.: Evaluation of Tubeless Gastric Analysis: Report of 90 Determinations by Intubation and Tubeless Methods Made Simultaneously, New England J. Med. **249**:68-69 (July 9) 1953.

3. Segal, H. L.; Miller, L. L.; and Plumb, E. J.: Tubeless Gastric Analysis with Azure A Ion-exchange Compound, Gastroenterology **28**:402-408 (March) 1955.

4. Gilbert, S. S.; Matzner, M. J.; and Schwartz, I. R.: Tubeless Gastric Analysis: Evaluation of (Diagnex Improved) Azure A Carboxylic Resin, Am. J. Gastroenterol. **27**:277-284 (March) 1957. Bolt, R. J.; Ossius, T. G.; and Pollard, H. M.: Clinical Evaluation of Tubeless Gastric Analysis, Gastroenterology **32**:34-40 (Jan.) 1957. Goldbloom, A. A.; Feinstein, M. A.; and Eiber, H. B.: Evaluation of Clinical Methods in Gastrointestinal Diseases: VII. Tubeless Detection of Gastric Acidity Using Azure A Ion-exchange Indicator, Am. J. Digest. Dis. **22**:288-291 (Oct.) 1955. Galambos, J. T., and Kirsner, J. B.: Tubeless Gastric Analysis: Evaluation of Azure A Indicator Compound, A. M. A. Arch. Int. Med. **96**:752-756 (Dec.) 1955. Sievers, M. L., and Gieselman, R. V.: Tubeless Gastric Analysis: Evaluation of Technique Using Dye-Resin Compound, Am. J. Digest. Dis. **1**:241-249 (June) 1956. Fentress, V., and Sandweiss, D. J.: Tubeless Gastric Analysis, Harper Hosp. Bull. **13**:184-186 (Nov.-Dec.) 1955.

5. Segal, H. L., and Glaser, G. L.: Early Detection of Gastric Carcinoma, New York J. Med. **56**:237-240 (Jan. 1) 1956.

6. Wirts, C. W.; Groves, J.; and Calderon, L.: Histamine Gastric Analysis as a Screening Method in Gastric Carcinoma Detection, Am. J. M. Sc. **229**:1-7 (Jan.) 1955. State, D.; Varco, R. L.; and Wangensteen, O. N.: Attempt to Identify Likely Precursors of Gastric Carcinoma, J. Nat. Cancer Inst. **7**:379-384 (April) 1947.

7. Shay, H.; Ostrove, R.; and Siplet, H.: Study of Tubeless Method For Determining Gastric Acidity and pH Values: Special Consideration of Subtotally Resected Stomach, J. A. M. A. **156**:224-227 (Sept.) 1954.

8. Poliner, I. J.; Hayes, M. A.; and Spiro, H. M.: Detection of Achlorhydria by Indirect Gastric Analysis, New England J. Med. **256**:1051-1053 (May 30) 1957.

COMPLICATIONS IN POSTERIOR FOSSA DUE TO OCCIPITAL TRAUMA—THEIR OPERABILITY

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Among 135,000 patients admitted to a hospital and clinic in a large, rural area, 296 underwent roentgenographic examination of the skull because of injuries to the back of the head. A fracture of the occipital bone was found in 98 patients, 32 of whom had severe complications. The 21 cases here described involved lesions in the posterior fossa and included 2 fatal cases of intracerebellar hemorrhage. There were eight cases of extradural hemorrhage in this region; decompression or removal of clots was followed by complete recovery in seven of these. The eighth was not relieved by making a bur hole in the occipital region; he died following a lumbar puncture, and autopsy revealed both an extradural hemorrhage and a bilateral subdural hematoma. Subdural hematoma was found in four patients, three of whom died; it is believed that all might have been saved had bur holes been placed in both supratentorial and infratentorial regions. Subdural hygroma occurred in seven patients, and all survived; more rapid improvement resulted from the making of bur holes into the posterior fossa to permit the escape of trapped cerebrospinal fluid and to reduce the intracranial pressure. In the past, attention has been focused on lesions to the surface of the cerebral hemispheres; these cases show that similar attention should be given to the structures in the posterior fossa.

Trauma to the occipital region of the head may cause hemorrhages resulting in death if surgical intervention is not accomplished. Little recognition has been given to injuries specifically confined to the posterior portion of the skull. Sporadic case reports indicate that hemorrhages in the posterior fossa as a result of trauma are operable lesions. The frontotemporal region, in contrast to the occipital region, has long been recognized as an area in which dangerous extradural arterial bleeding may occur as a result of a fracture in the region of the middle meningeal groove. This report is made to stress the importance of recognition and operability for hemorrhages and fluid accumulations in the posterior fossa as a result of cranial injury.

Approximately 135,000 patients have been admitted to the Hitchcock Hospital and Clinic, Hanover, N. H., which is a center of a large, rural area. Many patients with serious head injury must travel a long distance for neurosurgical attention, best accomplished in the one central hospital. Three hundred cases were found in which trauma to the occipital region of the head was the cause of the patients' seeking medical attention. Every patient showed evidence of local trauma, such as a scalp hematoma or laceration, to the occiput. Roentgenigraphic examinations were made on all but four patients. Of the 296, 98 were found to have fractures, which varied in their appearance, in the occipital bone. Of the 98 patients having a fracture of the occipital bone, 32 presented serious complications; and of the 198 not having a fracture, only 14 presented serious complications.

In order to understand adequately the pathology of this condition, a brief preview of the anatomy of the posterior fossa is necessary. The region of the brain below the tentorium is made up of pons, medulla oblongata, and cerebellum. The dura mater, arachnoid membrane, and pia mater envelop the brain. However, dura mater houses large venous channels—the transverse sinuses and the torcular Herophili—which lie immediately below the occipital bone. The subarachnoid space is continuous over the cerebellum and fans out into the cisterna magna. Thus, cerebrospinal fluid intimately accompanies the cerebellar contour and medulla oblongata through a rigid rim—the foramen magnum. The important arteries (vertebral and basilar) do not course in the occipital bone. The arterial supply of the cerebellum originates in the ventral portion of the posterior fossa. Because of the general anatomic situation of structures in the posterior fossa, the pathology of this area when injured is the same as that of the supratentorial region. Though lesions in the infratentorial region are comparatively rare, it is apparent from the series here reported that they must be anticipated in cases of occipital trauma.

The various lesions seen at the Hitchcock Hospital over a course of 20 years (1936-1956) include the following, which will be described: (1) extra-

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dural hemorrhage, eight patients (one death), (2) subdural hematoma, four patients (three deaths), (3) subdural hygroma, seven patients (no deaths), and (4) intracerebellar hemorrhage, two patients (two deaths).

In addition to the cases to be discussed, there were eight in which a tear in the transverse sinus was found and no hemorrhage was seen above or below the tentorium. Traumatic contusions of the cerebellum and intracerebellar hemorrhage are extremely rare, and we believe that subdural hygromas occur more commonly in the posterior fossa than has been described.

Extradural Hemorrhage

Hemorrhage into the extradural space as a result of trauma will compress the central nervous system in the cranial or spinal portion. As a result of cerebral compression either above or below the tentorium, neurological deficit, coma, and death will result. As contrasted with the bleeding of the middle meningeal artery in the supratentorial region, bleeding in the posterior fossa is generally of venous origin, and, in some cases, days, weeks, or, as in one observed case, months may pass before the compression will necessitate surgical intervention. The incidence of extradural hemorrhage in the posterior fossa is estimated at 0.3% of all craniocerebral injuries and 7% of all extradural hemorrhages, although this figure may be overestimated.

The reports of this lesion in the literature are summarized in table 1. The first significant report was made by McKenzie [1] in 1938. He recognized that this hemorrhage might arise primarily below the tentorium or might extend secondarily from hemorrhage above the tentorium as a result of a middle meningeal artery tear. His comments were interesting: "I have never heard of extradural hemorrhage over the cerebellum. If a diagnosis could have been made, operation would have been simple and recovery almost certain." He recognized that prompt diagnosis and surgical therapy would have saved all of his patients.

Coleman and Thomson [2] first successfully removed a clot in the posterior fossa of a 9-year-old child who had fallen backward and struck his head. The patient had been sent home from the emergency room of the hospital twice before the diagnosis was established. A midline fracture was present from the lambdoidal suture to the foramen magnum. The patient was operated on, and he recovered. Kessel,[3] shortly after this, also operated on a patient with such hemorrhage, and he indicated that patients with supratentorial hemorrhage from the transverse sinus had been operated on successfully.

After these initial reports, subsequent reports not only indicated increasing awareness of the lesion's occurrence but also presented great variation in clinical symptomatology and neurological signs. Most cases occur as a result of a backward fall, and the patient shows external evidence of occipital injury; however, one case was described as resulting from forceps injury in a newborn infant. Unconsciousness may or may not occur, and some patients have shown a lucid interval after an initial period of unconsciousness, only to relapse into coma—indicating serious medullary compression. Noting the period prior to medullary compression led Hooper [4] to classify cases as acute, subacute, or chronic. In certain patients coma, vital sign disturbance, and an enlarged pupil may be evident within 24 hours after injury, while in others two to seven days may pass before a desperate situation evolves. Headache, ataxia, nystagmus, dizziness, and a tendency to lie on one side will be followed by lethargy and decerebrate rigidity. Papilledema may be found, as well as a paralysis of the 3rd, 6th, 7th, 9th, and 11th nerves. Hypotonia and a stiff neck are common.

TABLE 1.—*Cases of Extradural Hemorrhage of Posterior Fossa as Reported in Literature*

Author	Yr. of Report	Total Cases	Patients Recovered, No.	Patients Recovered, Age, Yr.
Wharton	1901	2	1	12,24
Duret	1922	2	0	...
McKenzie	1938	3	0	...
Coleman and Thomson	1941	1	1	9
Munro and Maltby	1941	1	0	...
Kessel	1942	1	1	24
Turnbull	1944	1	1	38
Watts	1944	1	1	6
Fleminger and Smith	1946	1	1	16½
Gordy (reported also by Gross)	1948	1	0	Young
Anderson	1949	1	1	5-12
Bacon	1949	1	1	27
Grant and Austin	1949	1	1	26
Herren and Zeller	1950	2	0	60,49
Bonnal	1951	1	1	...
Campbell and Cohen	1951	1	1	2 wks.
Munslow	1951	2	0	20,25
Schneider, Kahn, and Crosby	1951	1	1	43
Lemmon and Schneider	1951	3	3	52,14,11
Beller and Peyser	1952	3	1	18,27,18
Campbell, Whitfield, and Greenwood	1953	5	4	8,9,8,66,6
Hooper	1954	7	4	20,49,8,15, 2,16,36
Saleeby, LeFever, and Harmon	1954	1	1	30
Present report	1957	8	7	51,12,4,6, 3,1½,15,50
Aronson and Ransohoff	1955	1	1	42

The bleeding has been found to arise mostly from the transverse sinus or at the junction of the sinuses (torcular Herophili). Due to a tear in these large venous channels, hemorrhage may compress the cerebellum and brain stem rapidly. Most patients will be found to have a fracture of the occipital bone by x-ray or at the time of operation, but it should be stressed that not all will show evidence of a fracture. The fracture may be found in any part of the occipital bone. Depressed fragments have rarely been reported.

The reports of five cases by Campbell [5] in 1953 and seven cases by Hooper [4] in 1954 have been the most numerous and informative. Both reports originated in large cities. In Campbell's report, four of five patients were under 10 years of age, and in Hooper's, five of seven patients were under 20. In our series, six of eight were 15 years of age or under and three of the eight were female. Most of the patients were referred a short time after their injury, and they were in relatively good condition. All patients presented evidence of occipital trauma, but two showed no fracture by x-ray examination. Signs of cerebellar injury were found in only three and papilledema in only two. Of the seven patients that were operated on, recovery occurred in all. The one patient who died, in 1939, had bur holes in the supratentorial region only.

TABLE 2.—*Summary of Findings in Eight Cases of Extradural Hemorrhage of the Posterior Fossa*

	Case							
	1	2	3	4	5	6	7	8
Age, yr.	51	12	4	6	1½	15	3	50
Sex	M	M	F	F	M	M	F	M
Time elapsed after injury before admission, days	1	4 hr.	1	4 hr.	5	9	1	9
Coma	+	+	+	—	+	—	—	+
Vital sign change*	BP↑	BP↑	P↑	—	P↑	—	P↑T↑	—
Lucid interval	+	—	—	—	—	—	—	+
Evidence of occipital trauma	+	+	+	+	+	+	+	+
Fracture of occiput	+	—	+	—	+	+	+	+
Nystagmus	—	+	—	+	—	—	+	—
Ataxia	—	+	—	+	—	—	+	—
Facial weakness	—	+	—	—	—	—	—	—
Hemiparesis	+	—	—	—	—	—	—	—
Babinski sign	+	+	—	+	—	—	—	—
Enlarged pupil	—	+	+	—	—	—	—	—
Deviation of eyes	—	+	+	—	+	—	—	—
Papilledema	—	—	—	+	—	+	—	—
Active sinus bleeding	—	—	—	—	+	—	—	—
Bur holes in posterior fossa	—	+	+	+	+	+	+	+
Survival	—	+	+	+	+	+	+	+

* BP, blood pressure; P, pulse rate; and T, temperature. Arrow indicates rise.

The following case reports are drawn from our experience (table 2).

CASE 1.—A 51-year-old male fell from a tree and struck the occipital region of his head. He walked to a doctor's office and was admitted to hospital Jan. 13, 1939. He vomited blood and soon was unconscious. There was a laceration of his right occipital region. He could not move his left arm and leg. His blood pressure was 200/100 mm. Hg; his pulse rate was 64 per minute. A Babinski sign was present on the right side. A bur hole was made in the occipital region, and no hemorrhage or contusion was found; however, the brain was under tension. Three days after admission, a lumbar puncture was done. The cerebrospinal fluid pressure was 270 mm. H_2O, and 10 cc. of fluid was removed. He became cyanotic and stopped breathing. The postmortem examination disclosed a fracture of the petrous ridge which extended to the right lateral sinus and foramen magnum. An extradural hemorrhage was present in the suboccipital region, and a bilateral subdural hematoma also was found.

CASE 2.—A 12-year-old boy was driving a tractor when it fell over. He was unconscious and taken to a local physician. His blood pressure was 148/68 mm. Hg, his pulse rate was 80 per minute, and he was drowsy. When taken to the hospital, he was found to have a contusion of the left forehead and a laceration of the occipital region. The eyes were deviated to the right, and a nystagmus to the right was noted. Reflexes of the right biceps and triceps were increased. There was a Babinski sign on the right. His condition was better the next day, but the nystagmus persisted. The left pupil was much larger than the right, and a facial paralysis was present on the right side. Decreased hearing of the right ear was noted. The child was seen to stagger when walking, and he showed confusion on the fourth day of hospitalization. On the ninth day, an extradural clot was removed from the posterior fossa. The child recovered, but the facial paralysis persisted, necessitating a hypoglossal-facial nerve anastomosis six months later, which resulted in some return of facial function.

CASE 3.—A 4-year-old girl was admitted to hospital six hours after having been struck by a horse's hoof at a race track. She was unconscious and had been since the injury. She vomited and was bleeding from the mouth. The pupil on the right was larger than that on the left, but both reacted to light. The pulse rate was 146 per minute, and the blood pressure was normal. She remained in coma. X-rays disclosed multiple fractures of the frontal, parietal, and occipital regions. Three days after admission an extradural clot, measuring approximately 30 cc., was removed from the left side of the posterior fossa. The child's condition was improved, and she was discharged 10 days later without neurological deficit.

CASE 4.—A 6-year-old girl fell downstairs and struck the back of her head. She did not faint or lose consciousness but vomited several times, was nauseated, and became sleepy. She was admitted shortly after injury; her examination disclosed normal vital signs, and she appeared well. However, she walked with a broad-based gait and showed ataxia. Nystagmus was present, more to the right than to the left. She was discharged with persistent nystagmus on the fifth hospital day. X-rays of her skull disclosed no fracture. She was readmitted six days later with severe suboccipital headaches and vomiting. Nystagmus was present, as was early papilledema. On the 11th day after injury, an extradural clot was removed from the posterior fossa. All of her signs cleared after one month, and her condition became normal.

CASE 5.—A 1½-year-old child fell from a car five days before and from a couch one day before admission. He was admitted to the hospital with a large hematoma in the occipital region. He had a pulse rate of 120 per minute. The eyes were constantly deviated to the right, without evidence of nystagmus. A fracture was present in the left occipital bone. The child also was found by examination to have a dermal sinus. His hemoglobin level, preoperatively, was 9.6 Gm. per 100 cc., and his hematocrit was 32%.

An extradural hemorrhage, measuring 50 cm., was present over the posterior fossa and the occipital lobes. A depressed fracture in the occipital region protruded into the transverse sinus. This was removed with furious bleeding. The sinus had to be sutured. The patient recovered without neurological deficit.

CASE 6.—A 15-year-old boy sustained a blow to the right occipital region nine days prior to admission, but was not unconscious. The area was tender, and two days prior to admission diplopia was noticed. He was admitted to the hospital with this complaint. His examination showed normal vital signs. His neck was somewhat stiff, and there was a paralysis of the left abducens nerve. Papilledema was present. An arteriogram showed no abnormality, and x-rays of the occipital region disclosed a fracture. An extradural hemorrhage was present underneath the fracture site; this was removed. The paralysis of the abducens nerve was immediately worse postoperatively and then became con-

siderably better; the papilledema also was worse for a short period of time. A lumbar puncture done one week after surgery showed the cerebrospinal fluid pressure to be 240 mm. H_2O initially, and the fluid was clear. The child's condition has subsequently become normal.

CASE 7.—A 3-year-old girl struck her occiput when knocked to the sidewalk by a large dog. She was not unconscious, but she became dizzy and confused and began to vomit repeatedly. The local physician noted nystagmus. When admitted to the hospital the next day, she was lethargic and her pulse rate was 120 per minute. Her respiration rate was 28 per minute and her temperature 101.4 F (38.5 C) rectally. A fracture was revealed on the right side of the occipital bone by x-ray. Bur holes in the posterior fossa disclosed a liquid and solid extradural hemorrhage 35 cc. in volume. She improved after operation and was discharged four days later. Slight ataxia was present in the hands one month postoperatively; follow-up examination six months later disclosed no abnormality.

CASE 8.—A 50-year-old man with muscular dystrophy accidentally struck the back of his head and was unconscious for a short period of time. He complained only of headaches for nine days, when he became suddenly comatose with extensor rigidity. He was brought to the hospital and was found to have a stiff neck and a minor occipital laceration. X-rays disclosed a right occipital fracture. A large, extradural clot in the cerebellum was removed immediately by surgery. He had a stormy postoperative course characterized by adrenal insufficiency and pneumonia, but he recovered and returned to his original status six months later.

Subdural Hematoma

The literature on the subject of subdural hematoma is sparse, indicating that instances of subdural hematoma in the cerebellar region are rare. Munro,[6] in reviewing 62 cases of subdural hematoma in 1934, described a patient who died as a result of bur holes being made in the supratentorial region for treatment of a subdural hemorrhage which lay both above and below the tentorium. Coblentz[7] removed a subdural cerebellar hemorrhage in a newborn hydrocephalic infant. He cited four cases that had been described previously—all were diagnosed at autopsy. Max Peet, in Brock's excellent textbook[8] on injuries of the central nervous system, says in reference to cerebellar subdural hematomas, "Rarely they are found over the occipital poles or the cerebellar hemispheres."

Webster and others,[9] reviewing 300 cases of penetrating cranial wounds, found 10 with cerebellar injury. The first patient reported was found to have a massive acute subdural hematoma, which was successfully operated on. Other case reports are infrequent, but mention must be made of the report of Achslogh,[10] in which a chronic subdural hematoma of the posterior fossa was described as successfully removed. No injury had been sustained by the patient, and he had had symptoms 14 months prior to surgery.

There are four cases in our series (table 3), and only one was in a child. In all cases, the patients showed subdural hemorrhage in all three cranial fossas, and only in one was surgery performed above and below the tentorium, with survival. An occipital fracture was found in only two. All patients were comatose, and two had presented a lucid interval. The patient who survived is the most recent in the series.

CASE 1.—A 62-year-old man fell downstairs two days prior to admission. He was admitted ambulatory to another hospital when he became unconscious and incontinent of urine; he had had a great deal of headache and vomiting prior to becoming unconscious. On admission to our hospital, he was semiconscious and his temperature was 103.8 F (39.9 C). His blood pressure was 180/95 mm. Hg, and his pulse rate was 120 per minute. His respiration rate was 28 per minute. He showed marked rigidity of his neck, he was incontinent of urine, and all deep reflexes were depressed. He moved his right arm less than his left. A fracture in the left occipital bone was found. A lumbar puncture showed an initial cerebrospinal fluid pressure of 220 mm. H_2O, and the fluid was grossly bloody. The day after he was admitted, he showed improvement, although he was still quite confused and a facial paralysis was present on the right side. Three days after admission, he showed drowsiness and his neck was a great deal more rigid. Lumbar puncture showed the initial pressure too low to read, and the patient died shortly after. Postmortem examination disclosed subdural hemorrhage of the left side of the brain and cerebellum present in the anterior, middle, and posterior cranial fossas. Necrosis of the frontal lobe was found, and an intracerebellar hemorrhage was also found in the right occipital region.

TABLE 3.—*Summary of Findings in Four Cases of Subdural Hemorrhage of Posterior Fossa*

	Case			
	1	2	3	4
Age, yr.	62	4	48	51
Sex	M	F	M	M
Coma	+	+	+	+
Lucid interval	—	—	+	+
Fractured occiput	—	—	+	+
Subdural hemorrhage in anterior and middle fossas	+	+	+	+
Hemiparesis	+	—	—	—
Nystagmus or ataxia	—	—	—	—
Bur holes above and below tentorium	—	—	—	+
Survival	—	—	—	+

CASE 2.—A 4-year-old girl fell down a flight of stairs and struck her head. She was immediately admitted to another hospital. She was transferred to our hospital 24 hours later, and died in the emergency room. A postmortem examination disclosed a fracture in the left occipital region extending forward to the temporal bone and to the foramen magnum. A subdural hemorrhage was present in the posterior fossa around the pons and the medulla, and this was also present in both the anterior and middle cranial fossas, although not as extensively. Petechial hemorrhages were found in the occipital lobe on both sides.

CASE 3.—A 48-year-old man fell from a tree, struck his head, and became unconscious. He regained consciousness, and tenderness was present in the occipital region of the scalp. The neck was supple. He was sent to the hospital, and a fracture was disclosed in the occipital region. This was elevated, and a tantalum plate was inserted. The patient showed drowsiness five days later, and eight days later his blood pressure was 200/80 mm. Hg. Lumbar puncture disclosed an initial cerebrospinal fluid pressure of 430 mm. H_2O. Bur holes revealed a subdural hemorrhage on the left side. Nine days after admission, Babinski signs were present bilaterally, and he stopped breathing. He died shortly after. At postmortem examination the fracture was

found to be present in the occipital region and to extend to the lateral sinus. A thrombus was present on the petrous sinus, and there was much subdural hemorrhage in all three cranial fossas.

CASE 4.—A 51-year-old man fell downstairs and struck his occiput. He was unconscious for 15 minutes and had a slight headache after this. Admitted to another hospital, he became drowsy, had a stiff neck, and vomited. He lapsed into coma 24 hours later, had two convulsions, and became incontinent. His blood pressure was 180/100 mm. Hg. Neither Babinski sign nor nystagmus was present. No fracture was found in the occipital region, despite his having a rather extensive hematoma of the scalp. Bur holes were made both above and below the tentorium; these disclosed 60 cc. of clotted blood above the tentorium and 35 cc. below. His postoperative course was extremely stormy as a result of pulmonary complications, and a tracheotomy was done. He was discharged in five weeks with his condition considered to be normal. He developed post-traumatic epilepsy, which was controlled adequately by diphenylhydantoin (Dilantin) sodium.

Subdural Hygroma

Cerebrospinal fluid may accumulate in the subdural space below the tentorium. These collections of fluid give rise to signs and symptoms of increased intracranial pressure, as well as to signs of distress in the local medullary and cerebellar regions. The cause for this fluid accumulation is not well understood: The literature in the past has been concerned with subdural collection of fluid in the supratentorial area, and Haynes [11] has stated, "I am not familiar with hygromas located elsewhere than over the cerebral convexity. Basilar, interhemispheric and posterior fossa hygromas, while anatomically possible, must be extremely rare."

TABLE 4.—*Summary of Findings in Seven Cases of Subdural Hygroma of Posterior Fossa*

	Case						
	1	2	3	4	5	6	7
Age, yr.	3	19 mo.	20	2	55	4	10
Sex	M	M	F	M	F	F	F
Time elapsed after injury before admission	6 hr.	1 d.	6 d.	2 hr.	6 hr.	6 hr.	1½ hr.
Coma or stupor	+	+	+	+	+	+	+
Fractured occiput	+	+	−	+	+	+	−
Evidence of occipital trauma	+	+	−	+	+	+	+
Nystagmus	+	−	−	−	−	−	+
Ataxia	+	−	−	−	+	−	−
Facial weakness	+	−	+	+	+	−	−
Babinski sign	−	+	−	+	+	+	+
Enlarged pupil	+	−	+	−	+	−	−
Papilledema	−	−	−	−	−	−	+
6th nerve paresis	+	−	+	−	−	−	−
Bur holes in posterior fossa	+	+	+	+	+	+	+
Survival	+	+	+	+	+	+	+

The cause of fluid accumulation has generally been assumed to be a tear in the arachnoid membrane, although Heyl and Small [12] have questioned whether this fluid accumulates in the subdural space as a result of altered permeability of the arachnoid membrane. Naffziger,[13] in 1924, said, "Subdural fluid accumulations after head injury seem to have escaped the comment of pathologists and surgeons. We do feel that, nevertheless, in such cases there is temporary benefit by the removal of fluid from the spinal canal." He indicated that these collections of fluid were seen with some cases of cerebral hemorrhage. Dandy [14] first used the term "hygroma" for collections of subdural fluid which occurred in trauma and mastoid infections and stated that these collections do not cause many neurological signs. Grant [15] has said that this lesion may account for a progressive or persistent intracranial disturbance after a head injury, status epilepticus, acute mania, or motor weakness. He also believed that spinal puncture helped to relieve the headache of these patients.

In analyzing our data (table 4), it appears that those cases in which there were significant and compressing collections of subdural fluid in the posterior fossa have occurred in young people. The neurological findings to indicate pathological conditions in the posterior fossa were not consistently significant, although most patients showed evidence of injury to the occiput accompanied by a fracture. Only one patient presented papilledema. All patients survived, being treated with bur holes in the posterior fossa.

CASE 1.—A 3-year-old boy was struck by a car and became unconscious immediately; though he soon roused, he later became drowsy. He vomited at least eight times on the way to the hospital. A laceration was present in the right occipital region, which had been sutured at another hospital. There were normal vital signs, but a dilated pupil was present on the right and a Babinski response on the left. He became stuporous overnight. X-rays disclosed a widening of the occipital bone synchondrosis. Bur holes placed above and below the tentorium disclosed a hygroma of the posterior fossa 20 cc. in volume and present on the left side. He regained consciousness immediately but had a paralysis of the left abducens nerve and walked with a wide-base gait for a period of at least one month. These signs then disappeared completely.

CASE 2.—A 19-month-old boy was hit by a car but did not lose consciousness. He vomited several times. When admitted to hospital, he had a temperature of 101 F (38.3 C) and a pulse rate of 124 per minute with respiration rate of 44 per minute. He became drowsy and, later, stuporous. His head was held to the left, and his left knee jerk was increased. He had a severe fracture of the right occipitoparietal region. Two days after admission, bur holes disclosed a cerebellar subdural hygroma 20 cc. in volume. The arachnoid membrane was visualized, and the fluid was outside of this; it was present bilaterally in the posterior fossa. Postoperatively, the child's head was held straight and he regained full consciousness. He developed a wound infection in the suboccipital region, due to Staphylococcus aureus, which was treated and cleared with antibiotics.

CASE 3.—A 20-year-old girl, involved in a car accident, was thrown out of a car door and landed on the back of her head. She was unconscious and remained so. No fracture was visible. At another hospital temporal bur holes were made bilaterally without disclosure of a hematoma but showing increased intracranial pressure. She was unconscious on admission to this hospital six days after her injury. She could not be aroused and did not respond to pin prick. Her vital signs were normal. Weakness of the right arm and left side of the face was noted. A bilateral abducens paralysis was found, and a bilateral Babinski response was present. On the 16th day after her injury, bur

holes were placed in the suboccipital region; these disclosed a subdural hygroma measuring 40 cc. in volume. On the fourth postoperative day she was able to talk and swallow. She subsequently recovered all function, with the exception of loss of vision in the left eye, due to a presumed optic nerve avulsion, and a bilateral palsy of the sixth nerve, which was repaired recently by muscle transplants.

Case 4.—A 2-year-old boy, while riding a tricycle, was hit by a car. He was unconscious but later showed movement. A large bruise was present over the posterior part of his head. He was admitted within an hour of his injury and was decerebrate. He had a stiff neck and fixed, dilated pupils. His pulse rate was 138 per minute. His respiration was shallow, at a rate of 10 per minute. He was pale and cyanotic, and he was bleeding from his nose and mouth. A linear fracture was present in the occipital bone from the transverse sinus to the foramen magnum. There was a fracture of the left tibia and fibula. Bur holes were made immediately, and a large bilateral hematoma was removed from the posterior portion of the occipital region. Bur holes in the suboccipital region disclosed a large subdural hygroma under severe tension. A cast was applied to the bones of the left leg. The child responded well three days after surgery. He is perfectly normal at the time of writing, three years after his injury.

Case 5.—A 55-year-old woman was involved in a car accident and was rendered unconscious after striking the back part of her head. She was in profound coma and was decerebrate, with enlarged, fixed, dilated pupils. Her pulse rate was 124 per minute. A laceration of the left frontal region had been sutured outside the hospital. There was also evidence of occipital trauma. A facial weakness was present on the left, and a bilateral Babinski sign was noted. A fracture was disclosed in the right occipitoparietal region. Bur holes, done above and below the tentorium, disclosed a subdural hygroma 40 cc. in volume in the posterior fossa. Ataxia was noticed postoperatively in the movements of her hand. Her temperature and pulse became abnormal, and she had extremely irregular respiration. She was subjected to hypothermia for a period of three days, and she eventually recovered. She was discharged after two months to a convalescent home and has shown further improvement, although she is unable to walk by herself and has disclosed palatal myoclonus. Her mentality is not adequate for her to care for herself.

Case 6.—A 4-year-old girl was run over by a car, and she immediately became unconscious and cyanotic. She was bleeding from her left ear. A fractured left humerus was present, as well as a depressed fracture in the left parietal-occipital region. This was elevated. The fracture was accompanied by a subdural hygroma in the posterior fossa, which was under pressure. The patient remained unconscious for a long period of time, and there was a right hemiplegia postoperatively. After five days she responded to pain, and she recovered normally in three months. An electroencephalogram done one month postoperatively showed a disorganized eight-per-second alpha wave in her occipital region and a five-per-second wave throughout her entire record.

Case 7.—A 10-year-old girl tripped and struck her head on a rock. She was not unconscious, but within 5 or 10 minutes she noted numbness in the left arm and within 15 minutes inability to walk and drowsiness. There was a dysphonia but not aphasia. She was admitted to the hospital 90 minutes after injury. Examination showed her to be completely disoriented and wildly irritable; there were bilateral Babinski signs, drowsiness, and restlessness. X-rays revealed no skull fracture. Bilateral supratentorial bur holes showed only increased pressure. Forty-eight hours later, focal left-sided seizures began, which resulted in a virtual status epilepticus. Reexploration of the bur hole on the right side again revealed nothing. The status epilepticus, which was always focal on the left side, continued for two days, and, finally, 80 hours later (three and one-half days after the trauma), early papilledema was noticed, a fine nystagmus was present, the neck was stiff, and bur holes in the posterior fossa revealed a cerebellar subdural hygroma, 50 cc. in volume, under pressure. The protein in the cerebrospinal fluid was 100 mg. per 100 cc., as against 7 mg. per 100 cc. in the ventricular fluid. After this, she immediately began to improve; within 24 hours her seizures were under control, and within 48 hours they had ceased. Four days after removal of the subdural hygroma, she was moving her left side and starting to talk. Twenty-one days after the removal of the hygroma and 25 days after admission, she was able to walk from the hospital with almost no neurological deficit.

Comment

Traumatic lesions of the suboccipital region which may be successfully operated upon are relatively rare, and only recently has the literature indicated that such operation is possible. These lesions display their signs in a much less pronounced fashion than others, and their development may be slower than that of a lesion in the supratentorial areas, such as an extradural hemorrhage. However, it should not be forgotten that some of these hemorrhages may develop quite rapidly.

In most of these cases, the patient will show an occipital fracture. Extradural hemorrhages of the posterior fossa may be successfully diagnosed and operated on, and the long-term results are equally as good as for those patients with supratentorial extradural hematoma.

It is evident that bur holes must be placed in both the supratentorial and infratentorial regions in order to have the patient survive. Bur holes are never adequate in examination and treatment of an occipital injury in either the supratentorial or infratentorial region alone. If, in three of our patients with subdural hematoma, bur holes had been placed in both the supratentorial and infratentorial regions these patients would have survived.

The presentation of seven cases of subdural hygroma of the posterior fossa needs further comment. These lesions have been found as a result of our being overcautious about traumatic pathology in the posterior fossa for which a successful operation may be performed. One wonders if the patients would have survived if no surgery had been performed. Perhaps they might have; however, we question whether convalescence might have been prolonged, and we also question the final neurological status. From what we have found at the time of surgery, we assume that the dural incision allows excess fluid, which has arisen in the subarachnoid space and has become trapped in the subdural space, to escape.

The surgical technique is relatively simple. A midline incision is made from the inion to the region of the second cervical vertebra, and bur holes are placed in both sides of the posterior fossa after the muscles and fascia have been separated. If

there is no lesion present in the extradural space, the dura is always opened to inspect the subdural area and the cerebellum. Endotracheal anesthesia is always used.

Summary

Serious complications due to occipital trauma may arise in the area of the posterior fossa. Such complications, including extradural and subdural hemorrhages and subdural hygromas, may be successfully operated on. Patients with injury to the occiput, who have a fracture or evidence of local hematoma with progressive embarrassment of vital signs, prolonged coma, or progressive cerebellar signs, should be subjected to surgical exploration. This is carried out by placing bur holes both above and below the tentorium.

References

1. McKenzie, K. G.: Extradural Haemorrhage, Brit. J. Surg. **26:**346-365 (Oct.) 1938.
2. Coleman, C. C., and Thomson, J. L.: Extradural Hemorrhage in Posterior Fossa, Surgery **10:**985-990 (Dec.) 1941.
3. Kessel, F. K.: Cerebellar Extradural Hematoma, J. Neurol. & Psychiat. **5:**96-100, 1942.
4. Hooper, R. S.: Extradural Haemorrhages of Posterior Fossa, Brit. J. Surg. **42:**19-26 (July) 1954.
5. Campbell, E.; Whitfield, R. D.; and Greenwood, R.: Extradural Hematomas of Posterior Fossa, Ann. Surg. **138:**509-520 (Oct.) 1953.
6. Munro, D.: Diagnosis and Treatment of Subdural Hematoma: Report of 62 Cases, New England J. Med. **210:**1145-1160 (Feb. 8) 1934.
7. Coblentz, R. G.: Cerebellar Subdural Hematoma in Infant 2 Weeks Old with Secondary Hydrocephalus: Operation with Recovery, Surgery **8:**771-776 (Nov.) 1940.
8. Injuries of Skull, Brain and Spinal Cord: Neuropsychiatric, Surgical, and Medico-legal Aspects, edited by Samuel Brock, Baltimore, Williams & Wilkins Company, 1940, p. 632.
9. Webster, J. E.; Schneider, R. C.; and Lofstrom, J. E.: Observations upon Patient with Penetrating Wounds Involving Cerebellum, Ann. Surg. **127:**327-337 (Feb.) 1948.
10. Achslogh, J.: Hématome sous-dural chronique de la fosse cérébrale postérieure, Acta neurol. et psychiat. belg. **52:**790-794 (Dec.) 1952.
11. Haynes, W. G.: Subdural Hygroma: Report of 3 Cases, War Med. **6:**34-37 (July) 1944.
12. Heyl, H., and Small, J.: Increased Permeability of Arachnoid Following Head Injury, J. Neurol. & Psychiat. **4:**270-271, 1941.
13. Naffziger, H. C.: Subdural Fluid Accumulations Following Head Injury, J. A. M. A. **82:**1751-1752 (May 31) 1924.
14. Dandy, W. E.: Chronic Subdural Hygroma and Serous Meningitis (Pachymeningitis Serosa: Localized External Hydrocephalus), in Lewis' Practice of Surgery, Hagerstown, Md., W. F. Prior Company, Inc., 1944, vol. 12, chap. 1, pp. 291-293.
15. Grant, W. T.: Subdural Hydroma: Cause of Morbidity After Head Injury, California & West. Med. **64:**246-249 (April) 1946.

UNDERGRADUATE MEDICAL EDUCATION AND THE CHANGING STATUS OF PATIENTS

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The general consideration of this panel is to center on the problems of specialty training that are resulting from the changing status of patients. I have been asked to discuss this same development from the standpoint of undergraduate education. While sequence may make the separate consideration of undergraduate and graduate education a reasonable division of labor, the facts of their interdependence and the educational principles and concepts that they must or should share in common makes it impossible for me to think about either one without the other. Because of this, as I have developed my assignment, by both implication and digression, I have had to make some reference to specialty education. Just as the undergraduate experience should be supportive to the graduate, I hope that what I have done will provide a useful background for the papers that are to follow.

I assume that in referring to "the changing status of patients" we mean that the time is at hand when almost every individual, on his own, through insurance or through some other mechanism, will be obtaining medical and hospital care on some kind of a remunerated basis, thus doing away with socioeconomic inadequacy as the factor which forces patients to the teaching services of our medical schools and hospitals. I believe that this assumption is valid because, as a trend, it is already apparent and also because it is a reasonable part of this nation's pattern of progress—a development that is coming out of the complicated interaction between medicine's increasing effectiveness, our

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rising standards of living, and a social awareness that is steadily placing a higher premium on human resources and dignity.

Change, even progressive change, is always associated with problems. But as our teaching programs in medicine react to the improving socioeconomic status of patients, I hope we will assert sufficient care so that we may not only dissipate and prevent problems but, at the same time, strengthen and improve our system of medical education. In other words, I hope that what we may do will represent an adjustment to change that will work in the interests of further progress.

This paper does not represent an effort to finalize the difficult line of reasoning that this approach would involve. Such is not within the capacity of any one individual. However, in order to be provocative on the one hand and yet not to appear indecisive on the other, I am going to indicate the reasoning I would offer if I were a member of a group of highly motivated, knowledgeable individuals who might be brought together to give our problems the intensive study and deliberation they deserve.

Adjustment to Change

I would first urge that all of the thinking and discussion be in line with the best possible medical education and that nothing be considered or accepted that would compromise this principle. This would be particularly productive because it would let us look to the future of medical education and what it ought to be without being side-tracked by present confusions and tensions.

Next, I would want the group to understand my concept of some of the background against which its deliberations should take place. In developing this, I would want to emphasize the importance of the growing relationship between the undergraduate and graduate levels of education. This could be accomplished by pointing out that, as medical facts, techniques, and concepts have grown in number, complexity, and importance, the stature of medicine has reached the point where it has had to be broken down into learnable parts. As a consequence, specialty training—the concerted learning of one of these parts—is becoming a must for every physician. Even general practice (I prefer the term general medicine) should require special training two to three years beyond internship. All of this means that the four years of medical school, the only formal professional education that all physicians will have had in common, must take on special significance.

I would then want the group to appreciate the two things that are particularly unique about medical education. The first of these is that, instead of the usual two-way teacher-student relationship found in most educational situations, in medicine three personalities are involved: the student, the teacher, and the patient. Furthermore, this patient needs help and, almost by instinct, seeks—even creates—a situation in which he becomes dependent on his physician. Insofar as possible, the student must become this physician. The student must have the opportunity to bring the knowledge and interest that result from intensive study into an active and responsible participation in the evaluation and management of human health and illness. Thus, the second thing that is unique about education for medicine is the peculiar situation in teaching institutions and services which makes this three-way relationship between student, teacher, and patient an effective educational operation.

Definitions in Medical Education

In order to complete this background and also to cross a bridge that would lead to considerations I would want to develop later on, I would next ask this group to consider the attributes and implications of four commonly used terms which can be very important to the changing status of patients and to the problems that are related thereto and can be solved therefrom. Without arranging them in any particular order, I would offer these considerations by asking and discussing a series of questions: 1. What is a student of medicine? 2. What is a medical teaching institution and a medical teaching service, as contrasted to a nonteaching institution or service? 3. What is a teaching patient? 4. What is a medical teacher?

Student of Medicine.—I realize that all physicians and medical scientists should be students throughout the duration of their professional lives. But, for the purpose of this question, I would define a student of medicine as an individual who is engaging in full-time study either as a matriculant in an undergraduate school of medicine or as an appointee in an approved internship or residency. The undergraduate experience must prepare for the graduate. As a consequence of this, the objectives of the two differ, in that the former is aimed at developing the fundamental principles applicable to the whole body of medical knowledge, at establishing habits of reasoned and critical judgment of evidence and experience, and at developing the ability to use these principles and judgments wisely in solving problems of health and disease. It is not the aim of the undergraduate experience to master the complete, detailed, systematic body of knowledge concerning any of the medical and related disciplines. This must be held in abeyance for the graduate years, when the student will undertake to become as proficient as possible in the complete, detailed, systematic body of knowledge and in the techniques and the judgments required to excel in the one discipline of his choice. (The sense of this statement of objectives is taken from "Functions and Structure of a Modern Medical School," Coun-

cil on Medical Education and Hospitals and the Association of American Medical Colleges, 1957.)

Since all physicians must go through this combination of experiences, it is basic to my definition that, as the student learns and increases in proficiency, he moves from lower to higher levels of patient responsibility. The undergraduate experience is one in which increasing responsibility is paralleled by close supervision; the graduate is one in which, as the capacity for independent responsibility increases, close supervision is gradually withdrawn, the ready accessibility to consultation taking its place.

Medical Teaching Institution.—Next, I would define a medical teaching institution or service as one in which the education of physicians and medical scientists is continually taking place. The administration, library, laboratories, service programs, research activities, and staff organization are centered on the student and the staff-student management of the patient. This complex of resources and activities must be so arranged and operated that good teaching, good research, and good patient care are not compromised. In contrast to all of this, in the nonteaching institution or service the organization of all resources and activities is centered on the individual practicing physician and his management of his patient. Good patient care is the only concern, and any teaching or research that may take place is secondary, often incidental.

It is the presence of the undergraduate student that constitutes the essential difference between the medical schools and their hospitals and the teaching services of the non-medical-school-connected institutions. But the graduate student is common to both. In addition, while the medical school situation may pose peculiar problems and call for special resources, since both the medical schools and the teaching services of the non-medical-school hospitals are in the important business of graduate training, I submit that our definitions and concepts of education must be such that, as far as fulfilling their missions is concerned, both must be in a position to strive for the same degree of excellence. If this is to be so, I believe that the day should soon come when specialty training in the non-medical-school situation should be limited to those institutions that can have on their staffs the basic as well as the clinical scientists essential to the best possible program.

Teaching Patient.—What is a teaching patient? With the thought in mind that I am still meeting with a group that is considering the impact of the improving status of patients on medical education, I would define a teaching patient as an individual who elects to enter a teaching institution or service, who, on admission, knows that his care is to be in the hands of the staff-student team, and who knows that, if there is good reason, his case may be approached from the research standpoint. Every individual so admitted must serve as a teaching patient, and the number or pool of teaching patients must be such that the clinical problems in which the student is to become involved can be selected so as to satisfy the needs of his particular level of learning. The pool must also be such that a student's clinical load is neither too large nor too small and not out of balance as to age, sex, or clinical entity and particularly as to socioeconomic status. If this last imbalance is to be avoided, it means that all individuals—the financially independent as well as the insured—must be eligible for care in the teaching situation. To use only insured patients for teaching would still limit the student's experience to but one segment of society.

I would point out that, at the present time, the clinical experience of too many students is limited to the low-income patient. This is not good education. Socioeconomic factors, particularly those of want and plenty, have important selective influences on the etiology, course, and prognosis and also on the evaluation and management of both health and illness. As a consequence, there is every reason for placing all students of medicine in a responsible relationship with individuals, both sick and well, from all walks of life, in their homes as well as in the outpatient or inpatient departments of the hospital.

Teacher of Medicine.—Finally, I would define a teacher of medicine as one who, in the field of medicine, possesses superior professional, scientific, and technical knowledge and experience and who, because of his ability to communicate and demonstrate this knowledge and experience, can motivate and inspire students to want to learn and, at the same time, provide proper leadership for this learning effort. I would have to take the position that, unless an individual possesses all of the attributes expressed in this definition, he should not be appointed or assigned to teaching responsibility.

Principles for the Changing Status

At this point, I would expect someone in the group to comment that, while I had made myself clear as to the background and uniqueness of medical education and as to my definition of the elements that play the key role in this phenomenon, I had yet to spell out the principles that would translate the changing status of patients into benefits for both education and care. This comment could well be reinforced by a reminder that the planning

and building of a curriculum, faculty, and facilities into an effective educational unit takes not only time but also continuing stability and that the thing that would be of most benefit would be the financial independence essential to the satisfaction of these conditions.

In response to this, I would have to express the opinion that the changing status of patients should lead to a socioeconomic situation in which more, perhaps most, of the people in the United States would have freedom to select their health and medical care from a wide spectrum of choice; further, the institutions organized and operated for teaching purposes, as well as those that are not, should be eligible for such choice; and, finally, the factor of competition thus injected into the situation should serve the best interests of both patient care and education. This is particularly important if high standards of service could stand as the main criterion on which competition would be based. High standards could have no better safeguard.

While I would advocate eligibility of the teaching program for competition, I would be the first to recognize that this competition should be held within bounds. An educational program should not be in business for business' sake. The patient load should be no larger than that needed to satisfy educational and research responsibilities and objectives. The financial benefits should be held in line with standard practice. And, conversely, if an individual should choose a teaching situation for his health or medical care, no special financial benefit should accrue either to him or, if he is an insured patient, to his insuring agency.

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Benefit to the Over-all Institution

Finances.—At this point, I would anticipate another interruption from my group, particularly from the university presidents and chancellors, asking just how all of this could fit into and benefit not just the medical school but the over-all university as well. I would expect this question to be amplified by the reminder that the programs of most medical schools place great, even detrimental, strain on the already limited financial resources of their parent universities and that if something could happen so that the above-average costs of medical teaching and the professional and hotel costs involved in service could be met from the sale of service, those universities with medical schools, as well as the schools themselves, would benefit immeasurably therefrom.

I would certainly agree with the reasonableness of this viewpoint, but in doing so I would want to caution the group that the deliberate exploitation of service programs in the interests of general university financing could not be justified. I would expect agreement on this point, but, again, I think the chancellors and presidents would insist that the earned income from service should fully compensate for the manner in which clinical teaching and service distorts the medical school budget, as compared with the other units of the university.

Again, I would agree. But, in addition, I would have to point out that, even though most medical schools enjoy budgets that seem disproportionately large, they still fall short of their needs, to the detriment of their teaching programs. While medical schools in the United States may not be permitted to operate on deficit financing, they can conduct deficit education. Time would not permit me to go into great detail here, but within many schools I could point out that the inability to finance the strengthening of certain programs or departments and to establish and maintain others is cutting short the quality education that medicine should offer. That the improved socioeconomic status of patients could play an important part in helping to correct these difficulties could be demonstrated by the fact that those schools presently with the fewest academic deficits are those that can admit patients who pay their own way. As my group would leave this portion of its discussion, I am certain it would agree that, if the improved socioeconomic status of patients was to be meaningful to medical education, its benefits would have to apply equally to all schools—rich and poor, strong and weak, large and small, tax-supported and private.

Faculty Policies.—With the encouragement that would come out of the hope of improved financing, I am sure that at least one university president would ask to hear discussion of faculty policies as they would apply to appointment, work time, and remuneration as between the school of medicine and the rest of the university. At this point, in order to be sure of a lively discussion, I would offer two definitions of "full time." The first of these would be strictly in line with the literal connotation of the term; the second would show deference to the fact that, while universities and medical schools might be using part-time faculty, the full-time concept should still apply.

The first definition: a full-time faculty member is one whose entire professional output, except for the privilege of occasional consultation, publishing, and speaking, is obligated to the university and is one who is reimbursed on this basis. The second: a full-time faculty member is one whose entire professional output, during the hours or days of his assignment, is obligated to the university and who is reimbursed on this basis.

Both definitions would imply that all faculty would be fully reimbursed by the university for the period of obligated time and that during this time there would be no demands on professional output from any other source. There would be no unpaid faculty, and there would be no faculty engaging in independent practice within the framework of the university program. Since the resident physicians render highly significant service to both teaching and patient care, particularly during the latter half of their appointments, I would bring them under the blanket of these definitions by appropriate faculty designations and also by remuneration far in excess of that which most now receive. This measure alone would do much to take the curse out of the presently long and expensive struggle for a complete medical education.

In short, it would be my thesis that the school of medicine, with its constellation of programs, students, patients, faculty, facilities, and financing, should be brought under the same kind and degree of control that the university exercises over its other colleges and programs.

Unaffiliated Schools.—Before this meeting could break up, I would expect someone to point out that, if all undergraduate education were to be under the aegis of the university, what about the fact that many medical schools have no connection with universities? My answer to this would have to be that any new institutions without university affiliation should not be established and that we should hope for the eventual university amalgamation of those presently in operation. I would also have to add that, in the meantime, these institutions should be allowed to receive the financial and other benefits envisioned in this discussion so that they could become universities in their own right, broadly polarized around human biology and its social, as well as its scientific and medical, implications.

Present Problems

The discussion of this hypothetical group has been a long and interesting one, and, as adjournment has taken place, I want to come back to earth and deal with a few of the realities of the present.

First, while much of my discussion has seemed to single out the university and medical school situations for special treatment, I think that with the use of a few different words the sense of my thinking could be made equally applicable to the teaching services of the non-medical-school-connected hospitals. Improvement as to income and income stability could go far in strengthening these important programs.

Also, it was with considerable reluctance that I included the intern in my definition of a student of medicine. In the eyes of many, the internship has reached the point where it is of dubious value as an educational experience. The circumstances that originally surrounded its establishment no longer pertain, and present trends in both undergraduate and graduate education are such that the time may be at hand when students should go into specialty training directly from graduation.

Returning now to the wind-up of my group meeting, I would expect most of the conclusions which would be reached to be quite different from the situation which medical education faces today. And I think things should be different. The differences I have in mind are tied to the provision of continuing financial stability and the independence and self-determination that go with it. This is the only thing that will protect schools of medicine in the United States from compromises that are inimical to the best possible education.

I do not say that the benefits that can come out of the changing status of patients would solve all of the financial ills of medical education. To particularize, there would still remain the fact of the manner and extent to which research is diluting the teaching budgets of universities and schools of medicine. If all of those agencies supporting research would provide the full cost, instead of only a portion, and if at the same time full compensation for the added costs of clinical service and teaching could be provided, the two most important financial problems presently hampering the growth of medical education would be solved.

We are living in an age which is characterized by rapid change. Such times dictate that action replace umbilical contemplation. With medicine increasing in effectiveness, with our population growing in size, and with our per capita level of education and purchasing power continuing to improve, we must anticipate the narrowing of the gap between medical need and demand and between medical knowledge and performance. The future is certain to call for more and better educated medical practitioners, scientists, and teachers. The degree of success with which we meet this future depends entirely on the performance of the system of medical education. It will take time to correct the financial problems of the schools of medicine and even more time to translate this correction into effective programming.

It is my opinion that, if the medical profession and the medical educators would both support the premises I have outlined, the solution to most of the problems facing medical education would promptly get under way.

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PROBLEMS IN SPECIALTY TRAINING CREATED BY THE CHANGING STATUS OF PATIENTS

T. Stewart Hamilton, M.D., Hartford, Conn.

Medical education is facing today one of the strangest combinations of paradoxes imaginable. In the first place, medical schools and voluntary hospitals in the United States have been confronted with the gravest of financial crises in a decade of unprecedented prosperity. In the second place, there is the paradox of rising per diem hospital costs with fewer and fewer patients who cannot meet them. A third and related paradox is that, although as a result of both shorter stay and more beds there is a vast increase in numbers of patients hospitalized each year, there has been a steady decline in patients available for postgraduate teaching. A further complication is the marked increase in the numbers of those seeking postgraduate education.

In order that we may not starve in the midst of this plenty, in order that we may fulfill our obligation to those who will follow us by providing them with the ablest and best physicians we can, we should first identify our problem, then seek to attack it. Visualization and identification of the problem is the purpose of this paper.

Baehr [1] notes four great changes in medicine over the past half-century: *(a)* institution of full-time teachers, *(b)* full-time chiefs of hospital laboratories, *(c)* full-time hospital scientific and educational direction, and *(d)* prepayment plans. Prepayment plans have permitted patients to come to hospitals today having prepaid a sizable portion not only of their hospital bills but of their physicians' and surgeons' fees as well. Since "he who pays the piper calls the tune," most of today's patients choose or are asked to choose a private physician to supervise their care while in hospital. Fewer and fewer patients are available for the intern and resident staff—or so it seems.

As we think of the intern and resident it is well to consider briefly where he is working and learning. One may think that postgraduate medical education in hospitals is taking place in all of the 6,966 hospitals listed by the American Hospital Association (A. H. A.). Recognized and approved programs are conducted in less than 10% of these hospitals, and of these nearly two-thirds are connected with medical schools.

In attempting to assess this problem of the impact of social changes on postgraduate medical education, several approaches were made. Among them were discussions with local confreres, such as John C. Leonard, director of medical education at Hartford Hospital, review of the literature, and letters sent to about 50 friends in the field of medical administration. Of the latter number, 34 replied. These replies were often two and three pages long and frequently included supporting documents. They indicate not only that much thought is being put into this problem but that it is general, for replies came from the length and breadth of United States and Canada, from Montreal, Canada, to New Orleans and LaJolla, Calif. They came from young men in the field and from such elder statesmen as Winford Smith of Johns Hopkins, Joseph Howland of Peter Bent Brigham Hospital, and Nathaniel W. Faxon of Massachusetts General Hospital. Faxon [2] reviewed well the historical background:

> The concept that led to the foundation of charitable hospitals was primarily the provision of a place to care for the sick, poor persons, those who could not be cared for at home. Along with this was the thought that the collection of these sick persons in a hospital would provide better instruction of future doctors. When it was found that they were receiving better medical care by reason of being in a hospital, facilities were provided for the rich and then for the middle class so that now all hospitals provide for the care of all classes.
>
> With such factors as growing prosperity and better wages, there developed the desire in most people to carry their own load and not to accept charity. The depression era put many hospitals into financial difficulties. These two factors produced Blue Cross. Welfare departments likewise broadened their views and accepted, in a limited way, the responsibility for the care of their wards in hospitals, moving them from the old-time poorhouse to the hospital when they were sick. After a long struggle, the welfare departments in many states have accepted responsibility to pay hospitals the cost of this care. Blue Cross has developed from the original idea of a complete service care to the idea of partial coverage with the patient paying part of the care.
>
> Blue Shield introduced another factor when it developed to cover professional charges for Blue Cross patients. This was all to the good, but it did produce an ethical problem, especially in surgical cases, when a patient selected a surgeon because of confidence in his surgical skill and then the surgeon wanted to allow a resident, for the sake of better training and the development of his surgical skill, to do the operation. It is the disappearance of the so-called ward patient, who, paying no professional fee, accepted as his contribution to medical teaching the granting to interns and residents the right to operate, under supervision.

Third-Party Payment for Hospital Care

Consider what has happened over this past quarter-century in the development of means of third-party payment for hospital care and its effect on the teaching program. There are three broad areas of third-party payment: prepayment plans,

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payment as an obligation of the employer, and payment for care of medical indigents. These should be considered separately.

Prepayment Plans.—Prepayment plans, born of the depression and begun amid serious misgivings on the part of many, no longer need an apologist. The number grew rapidly after World War II to reach a plateau by 1950 (fig. 1). The number of

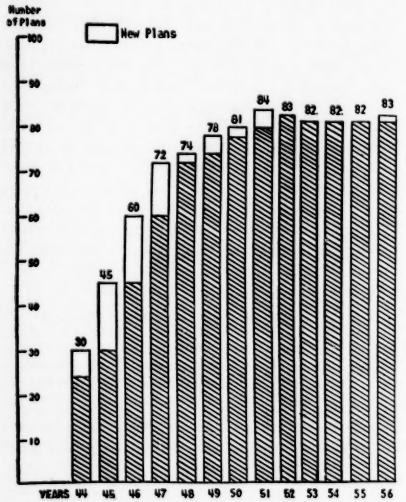

Fig. 1—Growth in number of voluntary health insurance plans approved by medical societies, plus Blue Cross or Blue Shield coordinated plans (Council on Medical Service, A. M. A., June, 1957).

subscribers, on the other hand, has shown a steadier increase until today the A. M. A. reports finding an enrollment of 42,200,000 in approved plans (fig. 2).

Total plans, as reported by the Health Insurance Council for the years 1955 and 1956, show even greater numbers, since they report persons protected rather than subscribers. A significant point to be made from their charts is that surgical expense coverage, which started later than hospital expense coverage, is catching up to it, while general medical expense coverage, for about half as many persons, is likewise growing rapidly (fig. 3, 4, and 5). Growth of the three major areas over the past 15 years is dramatically shown in figure 6. Coverage, of course, varies greatly, but the important fact is that an increasing segment of the population is prepaying part or all of both hospital and medical-surgical expenses. Some groups, such as those covered by the United Mine Workers Fund, may be provided not only with funds but with the services as well. These groups own, operate, and staff hospitals.

Payment as an Obligation of the Employer.—Awareness of our social obligations has resulted in great changes in the Workmen's Compensation Act. Gone are the days when one worker in the foundry (usually known as "Doc") with a penchant for aiding a stricken brother was the unofficial bonesetter. Today, the employer is responsible for treatment after accidents to his employees, even the foolhardy accidents, which occur on his premises or in his service. Medical care as provided by the employer falls into the following categories:

1. Workmen's compensation, whether in voluntary or proprietary (usually company) hospitals, provides for attendance by a practicing physician. Care of those injured in the course of their employment thus may provide an essential experience for the resident but not at the senior resident level.

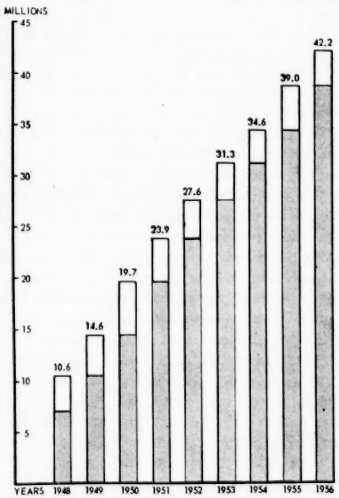

Fig. 2.—Growth in enrollment (1948-1956) in voluntary health insurance plans approved by medical societies, plus Blue Cross coordinated plans (Council on Medical Service, A. M. A., June, 1957).

2. In the military services, all accidents and illnesses are covered regardless of cause.

3. In Veterans Administration hospitals for service-connected and other disabilities the patients, like those in military services, may be cared for by men and women at all levels of postgraduate medical education.

4. In some mechanisms, such as Medicare, the dependents of servicemen come to voluntary hospitals as private patients rather than going to government facilities. Thus, within the past 15 months, a potential source of teaching material (in the old sense) has moved into the same category as those patients covered under voluntary prepayment plans.

5. Possible future mechanisms, such as extension of the Medicare plan to all government employees or such plans as the proposal to use the Social Security system to prepay health costs of the aged, will further deplete the dwindling numbers of service patients.

Payment for Care of Medical Indigents.—Medical indigents are those for whom hospitals were first built and thus have been the teaching material of the past. Payment or prepayment for care of these patients is usually made in one of the two following ways, both often occurring in the same community:

1. Payment may be made by hospital endowments, gifts, and Community Chest grants. Endowments are growing slowly, and, as hospital costs rise, the dollars earned from investments pay for decreasing amounts of patient care. Gifts, too, are not on the increase, except those for specific research projects, and these are limited to the study at hand. Community Chest groups often make grants to support service activities in many large teaching hospitals, but these groups, too, have been hit by rising costs, while new demands for their funds are outstripping increases in levels of giving. In many cities, more than half of the Community Chests' grants go to hospitals where they provide

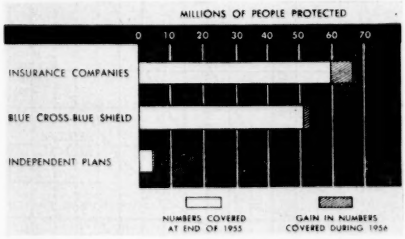

Fig. 3.—Distribution of hospital expense coverage by type of insuring organization (Health Insurance Council, August, 1957).

only a small percentage of the hospital's income. Hence, hospitals are turning more and more to the local government for funds.

2. Payment may be made by local government through (1) provision of its own city, county, and state hospitals, or (2) payments to voluntary or proprietary hospitals for care of the patients for whom it is responsible. In the financing of the care for a decreasing number of medically indigent patients, there is a decrease in the percentage cared for by endowment funds or community gifts and an increase in those cared for by government. Government already pays the physician for care of these latter patients when they are not in hospital. If this practice is extended to provide a fee for care of the hospitalized patient, there can be an even further reduction in the numbers of those who have in the past been the patients of the senior residents.

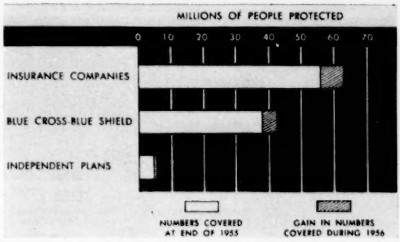

Fig. 4.—Distribution of surgical expense coverage by type of insuring organization (Health Insurance Council, August, 1957).

Prepayment and Type of Patients

As prepayment in its several forms expands to encompass an ever larger segment of the population, the problem is even further compounded by the fact that the remaining service patients (and patients in Veterans Administration hospitals as well) are to be found more and more in the older age groups. Those over 65 years of age are hospitalized oftener for longer periods and have less funds with which to meet these expenses than any other group (see table). There is evident not only a decrease in service patients but a concentration into the older age groups and thus of those with chronic degenerative diseases.

We can conclude that third-party payment plans have permitted many to come to hospitals as private patients who would otherwise have stayed at home or would have entered the hospital as service patients. In order to assess the seriousness of this problem of loss of the old-style teaching material, we must first determine whether the great relative decline in service patients is in fact absolute. In Hartford Hospital, for instance, the percentage of service to total deliveries has fallen during the past 25 years from 50 to 10%, but the number of service deliveries is not much lower now than it was then. In other divisions of medicine as well, we often find decreases in percentages are much greater than decreases in actual numbers of patients. Still, there is no doubt that, thanks to prepayment plans, the decrease in service patients is both relative and absolute.

The trend is one which no one will lament, the fact that prepayment plans have drastically reduced the numbers of medically indigent. Prepayment plans have provided the funds which have encouraged patients needing care to seek it and have permitted hospitals to purchase and operate the expensive new equipment which has been necessary in medicine's great advances over the past quarter-century.

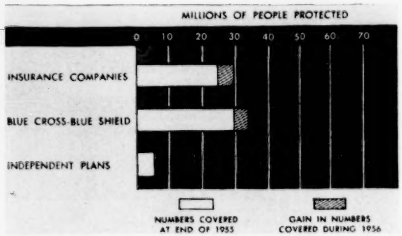

Fig. 5.—Distribution of medical expense coverage by type of insuring organization (Health Insurance Council, August, 1957).

Another trend which is still only an impression is the effect on teaching hospitals of the construction of suburban and rural hospitals. In these, less complicated illnesses are treated, and there is usually no postgraduate teaching. It is probable that many patients who might ordinarily be cared for by interns and residents in large teaching centers are now treated by their private physicians in hospitals near their homes.

Prepayment and Postgraduate Training

As there is no gain without a loss, the very mechanism which has made medicine's great advances possible is at the same time reducing the numbers of patients on whose cooperation we have depended for postgraduate teaching. As Ravdin [3] pointed out, "The sharp decline in ward material which has taken place during the last 10 years threatens to destroy the very basis upon which a good residency program of training in surgery should be accomplished. . . . This entire matter," he goes on, "demands the most careful study in order to find more adequate solutions." Bricker [4] also cites the problem, noting that the Halsted system of graduate residency requires (1) adequate supervision by a staff of mature surgeons, and (2) adequate clinical material. He says, "Economic factors are changing . . . but I do not believe . . . that this . . . means that the resident material should be drying up."

The effect of prepayment plans on Bricker's first point is well commented on by Armstrong,[5] who notes that teaching material is now in the hands of the successful practitioner rather than in those of the best teacher and says, "The physician skilled in running a large practice finds himself ill at ease. . . . He feels as much out of place as many an inspiring teacher might feel in a busy private office."

Thus, we see that a possible solution to the problem of the shortage of service patients by use of private patients is complicated by the fact that the practitioner-teacher is often inexpert, if not reluctant. It is further complicated because each of the practicing physicians has his own ideas of how much of the responsibility for the care of his patients he can delegate to the intern or resident. This problem in various forms comes up frequently in the journal, *Resident Physician*,[6] a paragraph or two of which will reflect the attitude of the thinking and observing resident:

The first attitude is that of the "real decent" (from the resident's point of view) practicing or attending physician. He introduces the resident to his private patient: "Mrs. Williams, may I present Dr. Jones. Dr. Jones is on the hospital staff and is specializing in gynecology. We work together quite closely here at the hospital. I would like you to consider him your doctor, just as you do me. He will be in constant touch with me on your progress, and I, of course, will be in to see you every day."

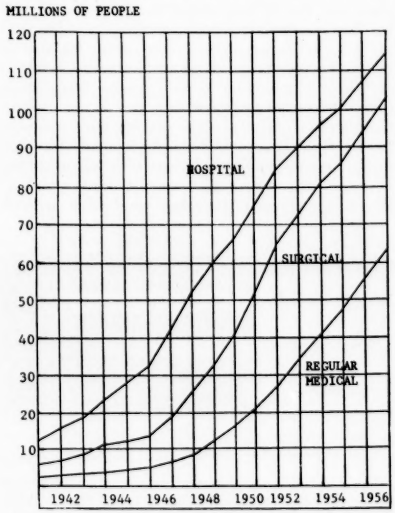

Fig. 6.—Growth of hospital, surgical, and regular medical expense protection (Health Insurance Council, August, 1957).

Often this type of attending physician will then discuss—solely in the interests of rapport and for the psychological value to the patient—some incidental fact about Mrs. Williams' condition. The resident will nod knowingly. Mrs. Williams will smile and feel well taken care of. Later, to the resident alone, the attending physician might say, "Work this up. Check with me on any heavy cost item first. Otherwise go ahead as if she were your own patient. Call me when you're through."

This type of practicing physician has bridged the often delicate, patient-doctor relationship to permit the resident responsibility.

At the other extreme is the "blood and scut" attending physician who seems to expect all infusions, blood tests, and charts to be done immediately or about 15 minutes before he orders them. But he will blow his top if the patient gets so much as an aspirin without his say so. His written order may be a brief "No pelvic or rectal by house staff."

Between these extremes can be found the majority of practicing physicians. The resident learns to play them by ear, to sense how much freedom and authority he might be given in each case. Before writing the orders, this type of physician will usually sit down and discuss each step of the work-up or therapy with the resident. Usually he will consider (and often accept) suggestions when offered by the resident. Even when the resident's idea seems a bit farfetched to this physician, if the cost is not excessive and the care of the patient not endangered, the attending physician, aware of his personal role in the education of the resident, will sometimes allow the resident to go ahead. And it is with this type of attending physician that the resident himself must be certain that his own attitude is good.

A further complication so well known it hardly needs mentioning is the vast increase in numbers of those seeking advanced training in the medical specialties (fig. 7).

Postgraduate Training and the Private Patient

If the service patient is vanishing from the scene and if postgraduate medical education needs patients for ever-increasing numbers of residents, we must explore the possibilities of the use of private patients. Nearly every one of the 34 letters received on the subject under discussion pointed to the use of private patients for teaching as an answer. There were other answers, such as use of governmental hospitals and group practice, but these will be covered by subsequent discussions. What are the effects, good and bad, of use of private patients and on whom?

*General Hospital Use by the Civilian Noninstitutional Population by Insurance Coverage, Status, and Age, 1956**

Insurance Coverage, Status, and Age, Yr.	Admission per 1,000 Population	Patient Days per 1,000 Population	Av. Days per Admission
All persons	101	810	8.1
Under 14	54	279	5.2
14-24	119	649	5.5
25-34	162	991	6.1
35-44	109	912	8.4
45-54	93	926	9.9
55-64	104	1,331	12.8
65+	125	1,744	14.0
With hospital insurance	113	836	7.4
Under 14	69	323	4.7
14-24	123	636	5.2
25-34	171	1,010	5.9
35-44	118	966	8.2
45-54	104	938	9.1
55-64	116	1,367	11.8
65+	135	1,752	13.0
Without hospital insurance	73	753	10.3
Under 14	28	200	7.3
14-24	109	683	6.3
25-34	132	928	7.0
35-44	80	743	9.3
45-54	64	889	14.0
55-64	74	1,245	16.8
65+	113	1,735	15.4

*Unpublished statistics, U. S. Public Health Service.

First we know that with the proper approach the private patient will almost without exception willingly cooperate. We know, as well, that in all of the specialities the private patient will fill teaching needs of the intern and junior resident. The problem comes with the senior resident who, in his last year, should be almost on his own, seeing his patients, making his decisions, and carrying them out.

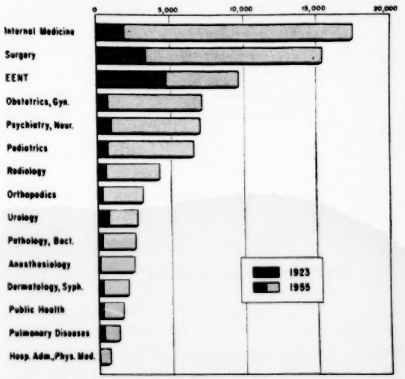

Fig. 7.—Changes in full-time medical specialists (Health Manpower Chart Book, U. S. Public Health Service, Publication 511, October, 1956).

This may be possible in medicine and its specialties, but is it possible in surgery and obstetrics? In a case recently reported by one correspondent, a patient was operated on by the resident with the surgeon scrubbed and standing by in the room. The patient sued the surgeon and won a verdict of assault and battery, abandonment, and trespass on person, let alone ghost surgery. Many surgeons and obstetricians feel a deep moral as well as legal obligation to perform themselves every procedure for which they contract with the patient. Some believe, as well, that if a patient has the means to engage a private physician he should not be offered the alternative of "going on service" even if he might elect to do so. Yet, as noted above, the possibilities of use of private patients must be explored to the fullest. In doing so, we shall undoubtedly have to amend concepts which, accepted as valid for years, now must be opened to scrutiny in light of present conditions and future trends.

Summary

Visualization and identification of the problem of material for postgraduate medical education can, then, be summed up as follows: There is a steady decrease in both percentages and numbers of ward service patients (once the sole source of hospital clinical teaching material). This is due in largest part to the growth of prepayment plans for hospital

and medical coverage. On the other hand, there is a steady increase in numbers of men and women seeking specialty training.

Use of private patients for teaching raises several problems, among them how to obtain a uniformly high level of teaching with a multiplicity of teachers who are not equally interested in or equipped for teaching, how properly to define authority and responsibility, and to what extent the patient can be asked to cooperate. The problem of the teaching material for the senior resident, especially in surgery and its specialties, remains the most knotty.

References

1. Baehr, G. H.: Changing Order of Medicine and Its Impact on Hospital Service, Mod. Hosp. **80**:92-102 (Feb.) 1953.
2. Faxon, N. W.: Personal communication to the author.
3. Ravdin, I. S.: Problems of Surgical Residency Training, J. A. M. A. **165**:1373-1376 (Nov. 16) 1957.
4. Bricker, E. M.: Health Insurance and Residency Training, Bull. Am. Coll. Surgeons **39**:75-76, 105 (March-April) 1954.
5. Armstrong, S. H., Jr.: Private Beds in Medical Teaching, in Proceedings of the 49th Annual Congress on Medical Education and Licensure, Chicago, American Medical Association, 1953, pp. 12-20.
6. Editorial, Resident Physician **2**:35-36 (Feb.) 1956.

FUTURE TRAINING IN MEDICINE AND MEDICAL SPECIALTIES

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New medical knowledge has accumulated at a tremendously rapid rate, especially during the past decade. Simultaneously, there has been an increasing demand for improvement in the quality and quantity of medical education, research, and patient care. Financial support for teaching and research has been expanding considerably. Moreover, the financial, social, and general educational status of the public has developed sufficiently to demand marked improvement in medical care. The extent to which physicians are facing the problems is variable, as shown in figure 1, but most of us have been insufficiently progressive in our planning. Large investments are being made in new medical school and hospital buildings, as well as in large staffs; but without adequate study of long-range developments, optimal success will be handicapped. The situation may be compared with the tremendous traffic jams that have developed as a result of insufficient planning in many large cities; making changes later is expensive and much more difficult. Many revisions must be made both in medical training centers and in medical practice. Alterations should be made in the kind of training, research, and practice that should be offered, the facilities provided, the type and scope of coverage given by the physicians involved, and the most appropriate administrative patterns for these activities. Each of these will be discussed.

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Full-time Academic Staff and Scope and Type of Their Coverage

The rapid accumulation of a vast number of medical facts has reduced the proportion of medicine that any one physician can master (fig. 2). Despite the great desirability of having each internist know all phases of medicine and in spite of the strenuous efforts which some have directed toward this objective, it is not possible. Thus, there must be a tremendous increase in the number of medical specialists. It is desirable to have specialists in allergy, dermatology, neurology, endocrinology, cardiology, respirology, oncology, genetics, renology, gastroenterology, nutrition, microbiology, hematology, rheumatology, isotope medicine, gerontology, and other fields. Indeed, there are specific departments of medicine that have more than 50 full-time staff members. Since the scope of specialization is frequently relatively small and since many different systems may be involved in a specific patient, criticism is given, frequently with justification, that there is overspecialization and that the patient is not treated "as a whole." Conversely, it may be stated that certain patients may be made "whole" and cease to be patients by consulting the appropriate specialist. Whereas it may be desirable for each physician to have both great depth and great breadth of knowledge, the two usually do not coexist, but it is possible for a group of physicians to offer both depth and breadth and to provide whole-patient care not otherwise available.

The efficacy of the plan of having many specialists, contrasted to having chiefly general internists, depends greatly on the extent to which the activities of the physicians are integrated; smooth teamwork is essential both in medical training and

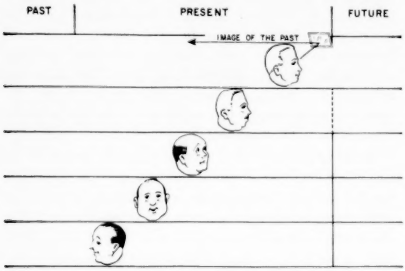

Fig. 1.—Levels of progressiveness of physicians. Top character represents smallest proportion of physicians—after carefully studying past developments he extrapolates probable course of future events; second character gets less clear picture of future because of insufficient study of past—"He who is unfamiliar with the past is subject to its pitfalls in the future"; third character has desire but not ability to visualize future; fourth subject represents largest proportion—those who are not sufficiently interested in past or future; bottom subject dwells in patterns of past and not only fails to contribute to progress but often actively opposes it.

in practice. In this connection, Gregg [1] points out that the extent to which specialties may be advantageous or disadvantageous depends on the degree of their coordination. He draws a wonderful analogy to the many segments of the arm. With fewer joints the movements of the arms will be simpler and easier to control but the accomplishments not as great (fig. 3). With increased friction or lack of communication between the specialists, the situation leads to inefficiency as is the case in an inflamed or ankylosed joint. Moreover, when specialists seek too much independence in their activities and fail to participate in a coordinated manner, the net accomplishments may be comparable to those of a flail joint. Thus, the nature of the administrative organization is important and must be considered in detail.

Administrative Organization of the Staff

With the great enlargement of the staff and the tremendous increase in the extent of their specialization, there has been a greater tendency, particularly in departments of medicine and surgery, to subdivide many responsibilities in administration, teaching, research, and patient care. These units are often called divisions. A problem for consideration is how to interdigitate most effectively the activities of a given division with those of other divisions and departments. One problem, for example, is the fact that there may be a full-time endocrinologist in as many as four clinical departments and in three basic science departments. There is often considerable duplication in their knowledge, as well as in their teaching and research. The question may be raised as to whether all seven of these individuals could function more effectively if they were brought together in an integrated division of endocrinology. Certainly, in some ways, the teaching, research, and patient care would improve therefrom. A similar situation applies to cardiology, hematology, neurology, physical medicine, and many other specialties. After some of these divisions have grown large, they have been set up as separate departments, with increased autonomy. The question needs to be answered as to whether such autonomy, if granted to a few specialties, should not be granted to most of the others and whether such arrangements would be advantageous or disadvantageous to medicine as a whole. This problem needs to be analyzed carefully and objectively. In any case, the departmental lines should be crossed by the various specialty divisions more than they have been in the past (fig. 4). Indeed, the question may be raised as to whether it is desirable to replace many of the existing departments with new departments designed in accordance with the greatest possible accomplishments in research, teaching, and patient care that can be offered by a particular specialty. Whereas the type of organization improves some situations, it handicaps others. With a compromise arrangement, diagrammed in figure 5, it seems possible to obtain advantages with relatively few disadvantages. This plan consists in decreasing the

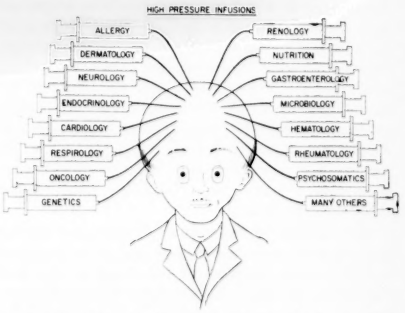

Fig. 2.—Full load of knowledge of all medical specialties: too much for any one physician.

intensity of demarcations between departments, whether basic science or clinical, and increasing the crossing of the boundaries by various specialties. The extent to which integration can be satisfactorily accomplished varies a great deal with the personalities involved, as well as with the needs

of the specialty. Many divisions have made great progress, on an informal basis, in integrating the teaching of the respective specialists throughout the medical school, and advantages have also accrued in research and patient care.

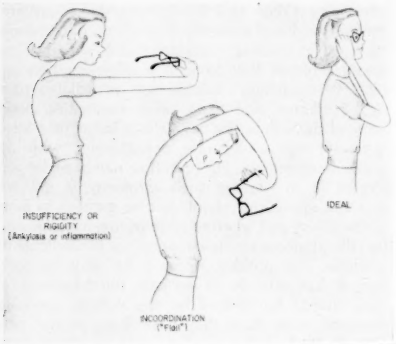

Fig. 3.—"Dysjointed" organization. Many divisions permit greater accomplishments and, if nicely coordinated, constitute ideal arrangement, but with dissension, excessive independence, or poor integration, desirable activities are impaired, as in case of ankylosed or flail joint.[1]

Administrative Organization Relative to Patient Care

Policies Relative to Type and Number of Patients Accepted.—Of course, the hospital facilities and the policies pertaining to them greatly influence the manner in which the staff should be organized. It is desirable for each medical school to have its own university hospital, designed in size and type to accommodate the needs for excellent teaching and research. These two functions constitute the major basic needs for the university hospital; other activities should be regarded as subsidiary and should not interfere unduly with the prime objectives, but, of course, there must be excellent patient care to serve as a basis for good clinical teaching and research.

The increase in the number of specialists needed has required an increase in the size of the inpatient and outpatient portions of the hospital. The staff should be provided with optimal types and numbers of patients for teaching and research; due consideration should be given to the needs of all the different specialties. This is particularly urgent since it is apparent that the time is rapidly approaching when essentially all patients in the United States will be paying patients, through one mechanism or another, and it is important to design the most appropriate policies for dealing with them. Indeed, it is my opinion that this probably will be the major problem confronting medical schools during the next decade. The policies followed in dealing with paying patients in some medical school centers have caused enormous antagonism between practicing physicians and full-time staff members. Much of the difficulty can be avoided by mutual, detailed consideration of the problems involved. It is helpful for the university hospital to accept only patients referred by physicians, to keep the referring physician informed relative to the procedures conducted on the patients, and to return the patients at the appropriate time to their own physicians.

It is important that essentially all patients admitted to either the outpatient or the inpatient portion of the hospital be accepted in accordance with their teaching and/or research value and that all receive excellent care. The full-time staff members should be engaged in full-time teaching and research and in activities contributing significantly to these. Moreover, most of the remuneration of each full-time staff member should be related to

COMPENSATED EXPANSION BY CREATING DIVISIONS

DEPARTMENTS	DIVISIONS							
	Card.	Derm.	Endo.	G.I.	Hemat.	Neur.	Phys. Med.	Other
Med.								
Obst.								
Ped.								
Psy.								
Surg.								
Other								

COMPENSATED EXPANSION BY CREATING DIVISIONS & NEW DEPARTMENTS

DEPARTMENTS	DIVISIONS							
	Card.	Derm.	Endo.	G.I.	Hemat.	Other	Phys. Med.	Neur.
Med.								
Obst.								
Ped.								
Psy.								
Surg.								
Other								

Fig. 4.—Upper diagram: activities of various divisions should cut across departmental lines. Lower diagram: certain divisions may become departments—usually after appreciable increase in scope of activities.

his contributions along these lines and not to the time spent with paying patients; in other words, a "strict full-time financial system" should be in operation, but the following practices should be avoided: corporate practice of medicine, exploitation of the clinicians by the university, excessive admis-

sion of patients (particularly paying patients), and excessive service in patient care alone by individual staff members.

Coordination of Patient Care.—The great increase in the number of specialists involved in teaching and in patient care has posed a number

DIVISIONS

DEPARTMENTS	Card.	Endo.	G.I.	Hemat.	Neur.	Renal	Other
Anat.							
Biochem.							
Physiol.							
Micro.							
Pharm.							
Path.							
Med.							
Obst.							
Ped.							
Psy.							
Surg.							
Other							

Fig. 5.—In comparing above diagram with figure 4, solid lines separating departments have been replaced by broken ones, indicating desirability of decreasing departmental demarcations. Broken vertical lines separating divisions indicate desirability of having interdigitation of some common departmental activities, basic as well as clinical science. Thus, there should be both vertical and horizontal integration.

of problems, the common demoninator being fragmentation. Better coordination results in considerable improvement in teaching and in patient care. Whereas it is not possible for one physician to master the knowledge accrued in all the specialties, he should have sufficient training to acquaint him generally with the contributions that the other specialties make and should interdigitate his activities with theirs. His teaching, research, or patient care will not be optimal unless he has this broad perspective. For example, allergic reactions may involve any system in the body and may manifest themselves in a great variety of ways; consequently, a good allergist must be an excellent internist in general and have a good understanding of many basic phenomena. Since, however, he (like other physicians) will be limited in his knowledge of certain subjects, it is important for him to work smoothly with a team of physicians who can readily supply this knowledge. These points have been borne in mind in outlining the general patterns for patient care now to be presented.

The proper selection and routing of patients in the university hospital can save considerable time and expense and will increase the satisfaction of the patient and his hospital physicians, as well as that of his personal physician. This necessitates the establishment of an excellent admitting screening service. This, of course, should be headed by a highly competent physician. He can send the patient to the physician(s) who can best handle his problem(s), and it is often clear to the admitting physician that the patient should go directly to a specialty clinic (fig. 6). When the problem is not clear, it is usually advantageous to send the patient to a general medical outpatient clinic or ward. In such cases, accumulation of additional information may make it apparent that the patient's problem(s) can be handled best by a specific specialty group, and he is referred directly to it. In the past, when the patient's problem has been complicated he has often spent much time and money visiting many different specialists without satisfactory results. The considerations of many specialists have been too restricted and not coordinated with those of other physicians. There are several ways in which this situation can be improved, and the common denominator of each is to increase the communication between the physicians dealing with the patient; the best communication consists in bringing the physicians together for a discussion of the patient's problems. One way to face this situation is to have a large clinic (general medical clinic) composed not only of general internists but also of specialists, including a representative from each of the medical specialities, psychiatry, gynecology, surgery, and others (fig. 7). These physicians should be immediately available in the clinic area and others should be available on an "on call" basis. Such a clinic arrangement has been established, in varying

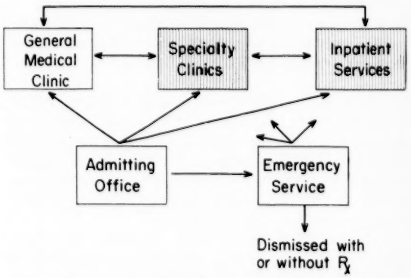

Fig. 6.—Patient routing. Appropriate routing of patients is highly important in saving unnecessary expense and loss of time by patients, staff, and students and in improving both teaching and patient care.

degrees, at several medical centers and has been designated as a "group," "conjoint," or "comprehensive" clinic.

The arrangement has certain advantages in teaching, research, and patient care in that consultation, though often limited, is immediately available. However, the following disadvantages have occurred: There are intervals when many of the dif-

ferent specialists are not particularly needed and could utilize their time better elsewhere. Moreover, it is difficult to have representatives from all the specialties present at one time. In most cases, the specialist believes that he can do a better job in

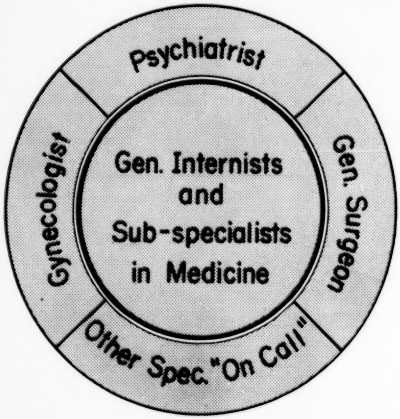

Fig. 7.—General medical clinic should be set up in a manner to provide consultations rapidly by representatives from medical specialties and from various departments additional to medicine. In instances where it is not satisfactory to keep a given type of specialist in the clinic, he should be readily available on an "on call" basis.

patient care, teaching, and research when the patient comes to his respective clinic. This is because there are many special facilities and special personnel at hand.

The over-all plans should consist of arrangements whereby consultations may be obtained rapidly not only in the general medical clinic from a variety of specialists but also in the other clinics. Such plans not only lead to more efficient patient care, but also assist in teaching and research. Moreover, they conserve time, energy, and money.

In some institutions, much attention has been given to specialty clinics but the general medical clinic has been badly neglected. Indeed, in some instances the case material in the latter is so uninteresting that it affords inferior teaching and does not attract a sufficient number of capable staff members to render optimal patient care. Conversely, other institutions, in a determination to correct this situation, have overcompensated in that they have established an excellent general medical clinic but have unduly withheld good teaching and research material, as well as students and others, from the specialty clinics. It is possible to have good specialty clinics and a good general medical clinic. However, even on attaining a high level in these regards, there is a minority of patients with problems that seem sufficiently diffuse to warrant referral to a different type of clinic, which might appropriately be called a conjoint consultation clinic (fig. 8). The only patients who should be referred to this clinic are those who have already had a relatively extensive examination in some of the other clinics but whose problems continue to baffle the physicians, particularly in that it is difficult to decide on the specialty field that is most involved. In this special clinic, each patient's problems would be carefully considered by several physicians who, as decided on the basis of previous examination of the patient, would be able to offer most to solution of the problems. These physicians would be representatives from any one department or more. Such a clinic could be of great benefit not only in offering good patient care but also in teaching and research. In the past, patients of this type have often received the "run around."

In much of my discussion thus far, as well as subsequently, two key themes are "coordination and collaboration"; with so many individuals involved in so many different ways, particularly in an academic institution, these are imperative. Thus it

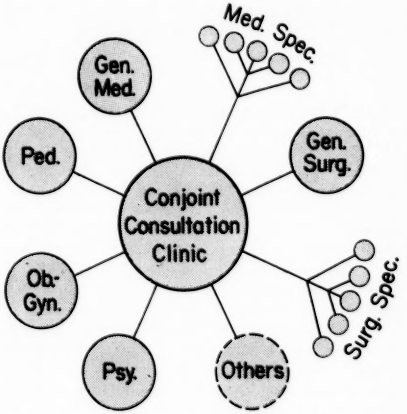

Fig. 8.—Patients assigned to conjoint consultation clinic are ones who have been examined in other clinics but whose problems have not been satisfactorily solved. Object of this clinic is to bring together several physicians representing different specialties, as well as general internists, to discuss all phases of patients' problems.

is necessary that the appropriate spirit prevail and that there is excellent leadership. Since, as discussed earlier, the prime purpose of the university hospital is to be of academic benefit to the medical school, it seems desirable for the head of the hospital to be the dean of the medical school. How-

ever, his duties are so extensive that some must be delegated. With respect to the university hospital, there are two "chief deputies," in particular, whom the dean needs: (*a*) a business administrator and (*b*) a medical director. The business administrator does not necessarily have to be a physician, but the medical director should be an excellent physician. In order to obtain the best person for the latter position, it is necessary for the business administrator and his assistants to handle as much of the business as possible, leaving the medical director to deal chiefly with professional problems. He should have the main responsibility for the assignment of patients, in accordance with policies recommended by a hospital executive committee. He should assist in the smooth coordination of interdepartmental activities, outpatient and inpatient. He also should play a key role in the maintenance of good relations with the practicing physicians and the public.

In addition to this over-all coordinator, the department of medicine needs a coordinator of its own. Such a person would have as his major duty the general supervision and coordination of activities in the general medical clinic and medical specialty clinics (fig. 9).

In the department of medicine, in dealing with inpatients, as with outpatients, a major problem involves designing a system which will offer optimal opportunities for teaching, research, and patient care. Again, it is important to coordinate the activities of the different specialists. A prominent question pertains to whether or not patients should be grouped in wards in accordance with the type of specialists who will handle them. Such an arrangement would benefit research and training of specialists in the field and, in some ways, would benefit patient care. Patient care would not be as good in other ways, e. g., less coordination of care from different specialists. The system also introduces problems relative to balanced training for students and house officers. It may be that this problem can be resolved satisfactorily and that there should be a segregation, but in the meantime it seems best to distribute the patients in the medical service at random.

Since, on a given ward, examination of the patients will be made by many different specialists, students, and house officers, it is important to coordinate their activities in the best manner. Figure 9 shows a plan which has distinct advantages. The major phase of the plan is to have a competent physician serve on each ward as "chief ward physician." Such a person should be an excellent internist; it may be that he will also be a good specialist in one phase of internal medicine, or he may not be a specialist, in which case he would be designated as a "generalist" or "general internist." To the chief ward physician would be delegated most of the authority for supervising the ward. He would have the responsibility of coordinating the activities of the specialists, house officers, research fellows, students, and others and of assuring them of good teaching and research facilities. Moreover, he must see that there is good patient care, and he must collaborate with the coordinator in the outpatient clinics in medicine to integrate the inpatient and outpatient activities.

Clinical Laboratory Facilities

A vast number of laboratory procedures have now been provided for assistance in patient care, but the average physician has been negligent in their optimal utilization. Facilities, space, and personnel have been far too inadequate and have frequently contributed to mismanagement and increased cost of medical care. It is highly important in university hospitals, as well as in many others, to have a person with a Ph.D or M.D. degree spend

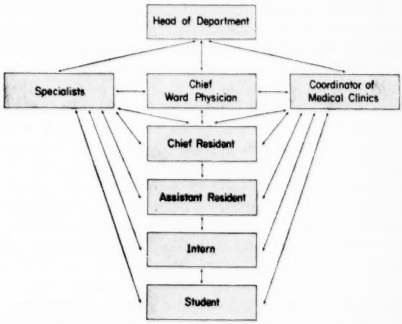

Fig. 9.—Administrative relationships. Proper coordination in teaching, research, and patient care is imperative in a training program. In this figure, the chief ward physician is assigned this coordinative responsibility for ward activities and coordinator of medical clinics for general medical and medical specialties clinic. They must work closely together as well as with other staff members involved. Medical director is coordinator of interdepartmental activities.

full time in the chemistry laboratory, a second such person in the microbiology laboratory, and a third in the hematology laboratory. These individuals should supervise the procedures and reports in their respective laboratories, adapt new procedures, and, through their own research, contribute new knowledge. Moreover, they should participate in the teaching of students, house officers, research fellows, and others. The positions should be set up in a manner to attract highly competent individuals. The other clinical laboratories, e. g., electrocardiography and electroencephography, should also be directed by experts, though they probably do not require full-time direction.

Graduate and Postgraduate Training Programs

Internship and Residency.—During medical school training, the student cannot be expected to acquire and understand more than a small portion of the facts he must learn eventually, but he will learn many approaches and methods for procuring data accurately and applying them with balanced judgment. As indicated by Pickering,[2] these are remembered after many facts have been forgotten. Much factual knowledge and excellent experience is gained during an internship. For one who plans to specialize in medicine, a rotating internship is not necessary. Whereas it broadens the prespective with reference to departments other than medicine, it prolongs training. After a straight internship, approximately three years should be spent in residency training by one who wants to specialize in general medicine. During this time, there should be sufficient association with all the medical specialties to allow the resident to become familiar with their major contributions. Moreover, there should be more than casual familiarity with the offerings of radiology, physical medicine, the clinical laboratories, and paramedical services.

Physicians who want to specialize in one phase of medicine should receive at least two years in that specialty, in addition to internship, and two years of residency in general medicine. At present, most of the training is offered as a traineeship or research fellowship, although in some instances a residency in the specialty is offered. Often the latter offers too little research training and the former too little clinical training; a significant amount of each is desirable.

In the past 10 years, there have been several factors which have interfered significantly with the quality and quantity of residency training; chiefly, these include (*a*) military service, (*b*) earlier accumulation of a family, (*c*) low salaries, and (*d*) misleading propaganda to the effect that a short training is sufficient.

Since a good house-officer training program distinctly offers the best practical training, it is a shame to curtail this unduly, particularly since, in most instances, eight years of college work has been obtained as a foundation for this training. With the marked decrease in physician "drafting" into the military service during the past year, this hinderance to training has become much less prominent. However, it is still desirable for the physician to finish his residency before obligatory induction. Past experience has demonstrated that many who have been inducted before completing training either do not complete it or obtain suboptimal training.

Low salaries for residents have played a prominent role in curtailing training. Many residents accumulate heavy debts, since they have a wife and several children to support. In most hospitals, residents' salaries should be increased markedly and, for senior residents, should be more than doubled. These individuals play a highly important role in teaching, research, and patient care. In addition, the chief resident handles many significant problems. In the good larger medical centers, he should receive no less than $6,000 per year. Considering the fact that the number of paying patients is rapidly increasing, it should be possible to take care of the pay for the senior residents via professional fees. They should be licensed and carry malpractice insurance. The fact that this group is still receiving training is not significantly deterrent, because the better ones are more competent and have better facilities and supervision available than many physicians in practice. With considerable increase in salaries there will not be the urge to hurry into practice nor will there be so much of a tendency to "sock the fees" to make up for the many years of financial suffering. Moreover, when the individuals do enter practice, they will be more mature and better prepared in many ways and should accumulate a clientele more rapidly. In the final analysis, the public as well as the medical profession will benefit.

It would seem advisable for some of the better community hospitals to employ full time, or at least half time, certain physicians who have just finished an excellent training to lead the house-officer training program. Such a program would be appealing to some of the young physicians while they are becoming established in the community. Moreover, it might often lead to a great improvement in the training program of these hospitals and better patient care, could prove to be of great assistance to many of the practicing physicians, and, in turn, would benefit the public.

Research Fellowship and Traineeship.—This type of training is essential preparation for most full-time academic positions and provides distinct advantages even for those who enter practice. The number of research fellows and the quality of their training has increased considerably in the past decade, but much additional progress is necessary. In general, those clinicians entering academic medicine should receive much more training than previously in fundamental aspects of research. Many have not received sufficient training relative to general objectives, experimental design, scientific critique, statistical analysis, and written and oral presentation of papers. Moreover, many are deficient in their knowledge of instrumentation and of pertinent laboratory procedures. Since there is a great increase in the number of basic scientists who are becoming full-time staff members in the departments of medicine and since they spend much more time in the laboratory than the clinical group, they are qualified to do a good job in helping to teach principles and methodology of re-

search; this trend should be encouraged by assuring these individuals adequate salaries and prestige.

In general, it seems advisable for the research fellow to spend two years receiving this type of training; he can then become more independent, usually being able to work in a senior research fellowship position. However, there has been inadequate financial support for this stage of senior experience, although some granting agencies have offered splendid support to a few candidates.

The total pay for research fellows should be significantly increased, although ordinarily there is not so great a salary deficiency in this category as there is in the senior resident group. The duration of residency training and the previous research experience should be considered in establishing the level of financial support.

Traineeships vary considerably. Some are similar to residency training, some are like research fellowships, and others are intermediate to these extremes. This flexibility is good, in that it permits adjustments for the needs in individual trainees.

Postgraduate Training.—With the rapid accumulation of new medical knowledge and the frequent modifications of diagnostic and therapeutic procedures, postgraduate training should increase markedly. There should be a better organization, systemization, continuity, and progression in the training courses offered. Several courses, one to two days in duration, as well as one of one to two weeks' duration, should be taken annually. A course one to two months long should be taken every three to five years. Examinations should be given for the benefit of postgraduates and their instructors in order that the most appropriate instruction may be planned. The course should contain more discussion by the participants, more training in methodology, and more case demonstrations.

Changes in Patterns of Practice

In line with the earlier discussion, relative to the need for a great increase in specialists and the concomitant greater need for coordination of their activities, various patterns of group practice will grow significantly. These groups will consist of representatives from many different medical specialties, as well as a few general internists. The larger clinics will also consist of many specialists in fields additional to those in medicine. There will continue to be a rapid decrease in the "broad-spectrum" general practitioners but an increase in "nonsurgical family physicians."

In general, the fees for internists, compared with the attention given to patients, are insufficient compared with those received by physicians in other fields of medicine, but justifiable increases are occurring.

Summary and Conclusions

The marked changes in recent years in social and economic conditions, the tremendous increase in medical knowledge, the great improvement in medical facilities, and the increased desire of the public for improved patient care, teaching, and research emphasize the importance of thorough and immediate provision of optimal future plans along these lines. There is a need for a great increase in specialists, but it is highly important that their activities be coordinated with those of other specialists and with physicians dealing with more general aspects of medicine. Greatest progress can be made by careful, calm, thorough, and objective discussions by many representatives of the medical profession.

References

1. Gregg, A.: Medical Institutes, Canad. M. A. J. **70**:449-453 (April) 1954.

2. Pickering, G. W.: Purpose of Medical Education, J. M. Educ. **33**:36-43 (Jan.) 1958.

RAW EGG WHITE AND BIOTIN.—At Yale, under Dr. Arthur Smith, I was investigating certain renal changes in rats on very high casein rations. Dr. Mendel suggested that in my thesis these changes should not be attributed to a protein effect unless the same results were obtained with the use of a protein which was not rich in phosphorus: he advised the use of powdered egg white. The tests confirmed the renal effects obtained with casein, but surprisingly, produced some quite different symptoms in addition. To clear up that piece of serendipity, I was kept busy, back at Wisconsin, for several years. . . . The solution of the puzzle came in fragments from several laboratories, a peculiar protein, avidin, in egg white reacts with the vitamin biotin in the digestive tract so that the bound biotin cannot be absorbed, thus sometimes creating a deficiency. Proper cooking of the egg white keeps it from interfering with biotin. Healthy adults, under normal conditions, probably are always capable of producing a protective amount of biotin in the digestive tract. Nevertheless, the extent to which raw egg white was used in hospital diets at one time, on the assumption that it was an especially digestible food, was an undesirable practice.—H. T. Parsons, Ph.D., In the Days When Vitamins Were New, *Journal of the American Dietetic Association*, April, 1957.

ASPECTS OF PEDIATRIC RESIDENCY TRAINING

Robert B. Lawson, M.D., Coral Gables, Fla.

Before any consideration can be made of the problems of pediatric training created by the recent changes in medical practice, it is desirable to state the ideal requirements for a graduate pediatric training program. Since the importance of health supervision is emphasized more in pediatrics than in the other special fields, we must recognize these two main areas (1) treatment of the ill child and (2) guidance of the physical and mental health of the well child. In the first category, we are interested in experience both with the more severe and dramatic, although much less common, illnesses of children and also with the common minor illnesses. In the second category, we need to give instruction and experience in the fields of normal nutrition, physical and mental growth and development, and regimens for infectious disease prophylaxis. We are concerned here with pediatric specialty training, but we must always keep in mind the sometimes similar and sometimes different problems posed in undergraduate teaching, in the preparation of general practitioners, and in giving experience in the special problems presented by children to candidates for other specialties. In terms of clinical facilities, the requirements to provide for this instruction have been met in the past by an inpatient and an outpatient children's service of a general hospital or in a separate children's hospital. In general, residents helped care for the private patients in the inpatient service by taking histories, by performing physical examinations, and by aiding in certain technical procedures, but decisions regarding therapy were usually made by the attending private physician. The resident staff's participation in decisions regarding therapy was usually limited to the service patients. The student rarely participated in the care of private patients at all, although these patients might be used for demonstration at some teaching exercises.

Changing Aspects of Pediatrics

The changes that have occurred in pediatrics have been somewhat different from those in specialties dealing primarily with adults, in regard both to service status and to the type of illness. The increasing use of hospital insurance and the appearance of specialized governmental programs have had a definite effect in shifting the classification of patients from service to private categories, especially in more highly industrialized cities where some of the children's hospitals have as many as 85% in the private category. However, I do not believe this shift is as noticeable in pediatrics as in other fields, since many insurance plans do not include the children. Even when some hospitalization is provided for the child, the physician's fee may not be included or the fee provided to the physician may be insufficient to make it feasible to change the medically indigent service patient to a private category. For this reason, this type of insurance or "agency" patient is frequently admitted to the teaching hospital as a service patient. If changes of category occur, they are allocated to an attending pediatrician on current assignment, but almost complete resident responsibility for therapy is maintained.

Another mitigating factor in this field is that the difference in accommodations for private and service patients is less noticeable in pediatric departments than in the other hospital areas. It is common practice to group children in the hospital according to age, sex, and type of illness rather than according to private versus "ward" accommodations, since children are better off together, if possible; however, a given infectious disease requires single-room isolation regardless of economic status. It is also easier to make use of a child's illness for a bedside teaching discussion without worrying about stepping on the toes of a private physician or having the family become concerned that their private physician is not doing his job.

Of more fundamental importance to pediatric services than the change in economic status have been the changes brought about by advances in medical knowledge that have resulted in a different type of illness in the hospitalized child. Improvement in nutrition has almost eliminated the need of inpatient care of children for disorders resulting from this cause, while wide application of immunization and the introduction of antibiotic therapy have made an even greater change in the diagnostic categories of admitted children. It should be recognized, however, that this same widespread antibiotic therapy has called for the admission of new types of patients, namely, those with resitant infections and those with toxic reactions to the antibiotics. The loss of much of the acute infectious and nutritional illnesses has been felt more by those hospitals depending on referred patients than by those close to large areas of indigent families. This change in diagnostic categories has been noticeable in all hospitals to some extent, however, and has required an adjustment in teaching methods.

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Read before the 54th Annual Congress on Medical Education and Licensure, Chicago, Feb. 10, 1958.

Availability of Patients

Where the shift to private status has interfered with the resident's assuming responsibility for sufficient patients (or, if the time should come when the medically indigent patients disappear), it is important that agency patients and private patients be used to augment service patients. The assignment of private patients to residents for diagnostic examination is generally accepted, but it is still difficult for the attending private pediatrician to meet with the resident on a busy service for a discussion of the care of his patient. This is an obligation of the private pediatrician that must be stressed, and he must be urged to give the resident as much independence as possible regarding therapy. It has been my experience that the failure of this liaison can be mitigated to some extent by having the regular ward attending pediatrician include all the private patients on his rounds. It only takes a little experience and tact to be able to discuss the diagnostic and therapeutic efforts of a fellow physician so that it is a valuable learning experience for the student or resident without infringing on the position of the attending private physician.

The Training Experience

The availability of hospitalized patients is the first facet of the problem, as discussed above, but sufficient opportunity to care for ambulatory patients and well children is of equal importance. One of the fundamental changes in pediatric practice has come about with the decrease in emphasis on the pediatrician's role as a consultant and an increase in that as a "physician to children" in health and for minor as well as for more severe illnesses. While one should not underemphasize the importance of special training in the severe illnesses peculiar to childhood that demand hospitalization, it is important to provide supervised experience in these other fields. In some areas, the regular outpatient clinics provide adequate opportunity for experience of this kind. It is becoming increasingly evident, however, that the opportunity should be available for long-term follow-up of the same children by a given resident in order to give him an appreciation of the many factors that influence a child's physical and emotional health over a period of time. The practice of assigning a resident to the outpatient clinic for one morning a week through his entire service has provided this opportunity, in contrast to the former custom of assigning him for a short block of time, as a reult of which he had little opportunity for long-term observation of a given patient. It is equally important that the pediatric resident should have training in the health supervision of children over a considerable period of time in a clinic for well children. The opportunity for extended contact with the same family for a period of months is especially valuable in gaining experience in the field of emotional problems. There is a growing emphasis on training in this aspect of child care that must be encouraged by making the training a worthwhile part of a resident's service. If the period is too short, the resident may end up with feelings of frustration that will seriously handicap his effectiveness in practice.

When the outpatient opportunities are limited, there are many other sources of clinical material to supplement the children available at the main teaching hospital. The most common is the use of public child health conferences, crippled children's clinics, or special agency-supported clinics, such as those for cerebral palsy or mental defects. There are, however, certain disadvantages in dealing only with indigent groups, in that their responsiveness and their ability to carry out suggestions or therapeutic regimens may be limited when compared to the clientele of a practicing pediatrician. It is possible to cover this deficiency of training satisfactorily by three means. One is to assign a resident to be part-time physician of a residential children's home. In this position, he makes daily calls to see sick children. Some of these children would correspond to the ambulatory patients seen in office practice, others would require bed care in the infirmary, thus resembling bed care at home, while others with more serious problems might need transfer to the hospital. The fact that the resident is on call for emergency conditions gives him an opportunity to participate from the onset in those illnesses in which early diagnosis is important, such as appendicitis, pneumonia, and meningitis. In institutional practice of this nature, the infirmary nurse can serve as a surrogate mother with excellent effect if she is the right type of person.

A second device that provides long-term care more closely simulating private practice is to assign residents to a special service for the families of students and other members of the house staff. This is especially applicable in medical school affiliated hospitals where the number of married students or members of house staff with children creates a sizable group. The resident gains a valuable experience while caring for these more sophisticated families and can call in whatever consultants he wishes for a given situation. This arrangement usually is well accepted by both the pediatric resident and the family.

Preceptorship training offers a third technique. This may be through passive observation of a practicing pediatrician in action, or the resident may spend a period of days (Saturdays, for example) or weeks working along with a practitioner or even take the place of a practitioner as a locum tenens. I believe the last would not be as desirable, however, as a situation in which a licensed resident takes the place of one of a group of practitioners.

In such an instance, one or more experienced practitioners are available for advice and support and for discussion of certain other aspects of practice, such as economics. The difficulty with protracted preceptorships is in the planning on the part of the teaching service. Unless one has a plethora of residents, it is not convenient to let one give up his regularly assigned duties to take over a locum tenens at the sporadic times they become available or convenient for the preceptor. This is a possibility for improved training, however, that might be profitable in some situations. A somewhat similar problem is presented in "farming out" residents to smaller hospitals that do not have approved training programs of their own. There is a great demand on the part of these hospitals that the larger teaching hospital send them residents, but this must be approached carefully. If appropriately chosen, the small hospital can provide the resident with a closer approximation to the type of patient seen in private practice and can give him a greater degree of responsibility than he assumes in the teaching hospital. On the other hand, there are certain deficiencies in the small hospital that may end up in the fact that the resident's short period of training is diluted too far.

Summary

All of the specialty fields share some of the same problems, but pediatrics is in a slightly better position than many of the other fields, since there has not been as striking a shift in the service to private category. Where it has occurred, the judicious use of agency and private patients for teaching has been well accepted. There is a more fundamental shift in the types of illnesses in many of the referral type of teaching centers. However, an imaginative use of available extramural facilities can make up for any deficiencies in types of clinical material and, in addition, will give the residents valuable experience with patients more closely approaching the type of patients he will have in his own practice.

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PROBLEMS IN TRAINING IN OBSTETRICS AND GYNECOLOGY DUE TO CHANGING STATUS OF PATIENTS

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Physicians at the Congress on Medical Education and Licensure are bound together by a mutual concern for the quality of the medical care of the future. The educator is not unmindful of the hazards of today's operation or delivery nor of the need for good patient care today. But to that concern he adds a sense of responsibility—a feeling of moral obligation—for the increasing safety of the operations and deliveries of the future. He seeks to discharge this obligation by investigation and research which may contribute to the well-being of tomorrow's patients, by the teaching of tomorrow's physicians, and by the training of his own successors.

In this latter field, the area of postgraduate residency training, the greatest changes of the past 20 years have taken place.[1] The creation of the various boards of certification in the specialties and the formal approval of residencies and their public listing are steps which have had an impact on postgraduate education not unlike the impact of the Flexner reports on undergraduate education some 40 years ago. The quality of such postgraduate training has steadily improved, and, while eternal vigilance is required to maintain this improvement, the contrast with the old apprentice system (or lack of system) is unmistakable.

The discussions of this congress represent one aspect of such continuing vigilance; this panel has been assigned the task of considering thoughtfully the impact of the socioeconomic changes in the status of patients on the concept of good residency training as we know it today. The truth of the matter is that, as we have known it in recent years, the training of residents has largely rested on the presence in the communities of medically indigent people. To pretend that medical indigency is not disappearing or could never disappear is only to assume the ludicrous position of the ostrich. There is little use saying that a depression will reverse the trend toward increased health insurance coverage;

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this is somewhat analogous to the military commander who assumes his flank can never be turned and hence makes no plans for such an eventuality.

In accordance with the implications of the topic, therefore, I would like to consider this situation on the assumption that the trends we see today are carried tomorrow to their extremes. Without pausing to debate whether these phenomena are likely to occur or at what rate or whether they are socially and medically desirable, let us think together on the basis of this triple assumption: 1. All patients have some form of medical insurance. 2. The spread of good hospital care peripherally in our larger cities and into our smaller communities continues. 3. The increasing size of our medical classes portends an increasing number of well-trained specialists.

Against a background of such enchanting premises, what are the features unique to obstetrics and gynecology which require special thought? Is the problem in all instances the same? Do we in obstetrics and gynecology face a common challenge with medicine, surgery, and pediatrics? Fearful lest my answer to these and to some of the other questions should become too personal, I have approached this by surveying eight medical centers in addition to my own. This survey was conducted with the agreement that specific figures and personal opinions would be held in confidence. Although in many details the chiefs of services were not all in agreement and while the centers were deliberately selected to tap varying local situations and backgrounds, nevertheless there is a surprising unanimity among them as to the potential seriousness of the problem. While I am grateful to these colleagues, it must be emphasized that they are not responsible for the ultimate content of my remarks.

Unique Aspects of the Problem in Obstetrics and Gynecology

Obstetrics and gynecology faces some unique aspects in this problem: 1. Since it is a surgical discipline, the phrase "increased use of private patients" is one of those pat solutions which are often glibly offered but are almost always completely meaningless. The essence of the surgical relationship during the training period lies in the transfer of responsibility to the resident. Unless the selection of the patient who is to be subjected to surgery is originally his, unless the postoperative management rests on him and also the responsibility of talking with the friends and family in the event of complications, unless, in short, the patient is "his" patient in the best sense of the word, then we will train a group of accomplished technicians who will have been ghosted to technical aptitude but we shall not have trained gynecologists.

2. Obstetrics and gynecology is a medical-surgical specialty in a way that general surgery is not. The general surgeon may resect a stomach for intractable ulcer when the internist asserts that all medical management has failed. With the intractably bleeding uterus, the gynecologist is his own internist, so to speak, and his medical half certifies to his surgical half that nonoperative therapy has failed and that surgical extirpation—the eternal confession of failure—must be resorted to.

This means that the medical center which has referred to it only those patients for whom medicinal therapy has failed and who require operation is not adequately supplied with problems for good obstetric and gynecologic training. The adage, "if it can't be cut, we won't take care of it," is not compatible with the care of the diseases peculiar to women, and the sterility problems, the endocrine disorders, the discharges, and the functional complaints would be missing from such a resident's experience. Properly practiced, gynecology usually requires between 50 and 70 patient visits to the office legitimately to produce one patient in the operating room. When one is one's own internist and when one is committed to the principle of the conservation of human reproductive potential, then the techniques of avoiding surgery must be taught as thoroughly as the techniques of performing surgery.

3. The decentralization of young couples is influencing the availability of patients in many teaching centers. Much of our clientele is young, and the young families are the ones principally moving to the peripheral areas.

4. There is, in most situations, little to be gained for a department of obstetrics and gynecology by an alliance with a Veteran's Administration hospital. As in the situation of pediatrics services, most of the government-controlled beds do little to supply our teaching needs.

5. The peculiar emotional reaction of patients and their families to pelvic problems and to gynecologic complaints also influences the patient situation. Given a modicum of medical insurance coverage, many families will still have the children's tonsils removed in the staff service and will have father's varicose veins fixed on the staff service but will use their modest coverage to assure private care for mother's "female trouble" and for the repair of her prolapse.

Suggested Solutions

Rather than consider a whole series of possible solutions to this problem merely to discard each one of them, let me mention only two which are frequently suggested and which embody two differing fundamental attitudes in the approach to this situation. In considering any such proposals, we are basically interested in the principles involved rather than the specific mechanical details, which may vary widely from location to location and from year to year.

Division of Residency Program into Two Portions.—It is often suggested that the residency programs be split into two portions, one part of the training period remaining centralized and the other part becoming peripheral in the hospitals of the surrounding communities. "Let the resident go where the patients are," runs the philosophy here. Since the large training centers have the facilities, as well as the men, to teach steroid chemistry, postoperative renal function and electrolyte balance, gross and microscopic pathology, and the many other imperative facets of resident education, let the first few years be spent in such centers, while for the bulk of his actual surgical experience the trainee would repair to smaller hospitals.

Superficially, this would seem to leave everyone reasonably happy, but it should immediately be pointed out that such a statement automatically implies that everyone is also reasonably unhappy. In essence, this scheme represents an attempt to mix the contemporary residency with the old preceptorship, and, while the preceptor system produced some highly colorful surgeons, it is irretrievably associated in our history with empiricism. To quote Ravdin,[2] "Under the preceptorial system the trainee performed a posterior gastroenterostomy for an intractable duodenal ulcer because his preceptor did this operation. . . . Those trained under the residency system had, in general, a more thorough appreciation of the physiological abnormalities imposed on the patient as a result of disease and were better able to care for certain of these abnormalities."

There is another added hazard: By the very location of their practices, by the nature of the way of life that they have chosen, the men designated under this proposal as the preceptors would be the very ones who had sought to avoid teaching associations or pedagogic responsibilities.

These contracts for divided training, where they have been formed, do not always result in happy bedfellows. The "Great Man" complex may creep on the unwary preceptor: "How can this fellow possibly practice unless he hears every word that I utter and does things just the way I do?" Rigidity replaces the spirit of free inquiry, and these alliances—like those with a possessive mistress—are alway easier to initiate than to break off.

Private Resident Clinics.—The proposal has frequently been made that we can solve much of this problem by the formation of private resident clinics. "Let the chief resident group become the responsible partners in a private-type clinic, with the visitants serving only as shadowy consultants" is the philosophy. The patients would have no misunderstanding as to who would be performing the operative procedure; fees would be collected for services by the clinic manager, and the full range of medical and surgical obstetrics and gynecology could be performed. In essence, teaching clinics would continue, under such a proposal, to accept the same patients they now serve; a change in standards of financial screening by the clinic would accompany increasing financial support of the patients. Women would be ruled acceptable for ward service who now are being turned away because in 1958 we cling to 1939's definition of medical indigency. In essence, the resident would be caring for the same group of women he is now caring for; this proposal simply upgrades the resident in the patient's eyes as she is financially upgraded by mass health insurance. I have no doubt that such a clinic would attract patients; indeed, if it did not it would behoove those teaching there to improve its attractiveness or to reduce the size of their residency staffs to be proportionate to the number of patients enrolled. We must not slice the operating experience too thin simply to get more personnel to render service.

This plan, proposed by many and attempted by some, immediately encounters three obstacles which will have to be reckoned with and cured prior to its successful application. First, the American Medical Association, acting through the agency of the local county medical societies, screams, "Unfair competition," and fights every step of the way. That it is competition is inherent in the very nature of the proposal; that an established practitioner should feel resident competition "unfair" speaks poorly for the quality of his own medical service.

Second, there are possible insurance problems. Many of the health insurance programs will not pay fees for operations performed by members of the resident staff. In view of the fact that in my city, as but a single example, these companies pay readily for the surgery performed by the full-time employees of the Cleveland Clinic, this is obviously a matter of semantics which will require us to reclassify our residents and to employ some term to which these companies are less allergic.

Third, tax problems are often cited. The resident is paid a standard (often a substandard) salary, in no way commensurate for the services he performs. Who pays the income tax on the total moneys collected? Once again, guided by the example of the many private clinics in the United States, I am confident this aspect is also susceptible to ready solution. Unfortunately, the reaction of the average physician to the tax bureau includes so much palmar perspiration that it often makes him oversensitive on this topic.

This type of solution to the increasing shift in the status of outpatient population has been presented often and more persuasively. It is here offered only as a thumbnail sketch, because, with each new proposal, the planner quite rightly alters the details. But if an approach of this general nature seemed to offer some hope, what positive steps would have to be taken?

In the first place, we must educate our county medical societies not to be eternally opposed to educational advances. In a period of frank anti-intellectualism, this will be no mean feat, but it remains true that the local representative units of the A. M. A. situated near the large teaching centers have consistently looked askance on many of the advances in postgraduate training. Much of this reeducation must stem from a new enlightenment within the parent organization itself, but the men in the trenches—the men actually carrying the burden of residency training—must also assume their share of this obligation. I join a distinguished colleague of mine who says, "One of the things that annoys me a great deal is that while we are training residents they want everything they can get their hands on, and, as soon as they get trained and out in practice, they soon accept the general philosophy of members of the county medical society in most of the areas and are reluctant to use any of their private or semiprivate patients for teaching material." We ourselves must instill in our resident group a devotion to the training of younger men which will survive contact with the current attitude of the practicing physicians. I would agree with Zollinger's statement: [3] "There is an urgent need for medical evangelists to rekindle a feeling of keen responsibility in the individual surgeon in every hospital in this country for the education of his eventual replacement. Certainly no one escapes the moral obligation of taking part in the education of his successors." As a positive gesture, therefore, let us make sure the rank and file of practitioners join in this effort to provide adequate training material for our future residents.

Second, medical insurance companies must be reeducated to recompense for the care rendered by the resident group. I live in a state which does not require an internship prior to practice. Therefore, a man who graduated from medical school last year and is practicing this year may collect from Blue Shield in Ohio for a hysterectomy, no matter how well indicated or how competently executed. On the other hand, a man with an internship, a year of training in general surgery, and three and a half years of thorough specialized training in obstetrics and gynecology cannot collect insurance for a hysterectomy because he bears the title, resident. The stupidity of this situation is so apparent it needs no further comment.

Finally, all laws introduced to provide for the health insurance of various segments of the population must include in their preambles the statement that any patient so covered automatically becomes teaching material. It is amazing that not one of the expensive lobbys which have opposed such legislation has ever stressed (or even mentioned) this point. In the current opposition to the Forand Bill, for example, no pressure is applied to include this stipulation in the obligatory health insurance of those eligible for social security benefits. Had those who have appeared in the past to testify against such legislation at congressional hearings ever mentioned this obvious prerequisite, their good faith and their genuine interest in medical training at all levels would—by such testimony—have received more than lip worship.

These, then, represent two forms of solution to the problem of the shifting status of patients in obstetrics and gynecology with relation to residency training programs: the approach of hopefully sending the residents where the patients are to be found, and the approach of altering our definition of "staff service" patients as the economic winds blow from a new direction. Before concluding, let me repeat that I have been reasoning from two premises: The first is that these changes will have an inevitable impact "on the concept of good residency training as we know it today." That changes could take place in ourselves and in our concept of good residency training must be recognized. We are not, I hope, personally immutable, but let us always guard against receding, against yielding to passing pressures by lowering our standards. If a new concept of residency training is to be formulated, we must examine it critically to insure that it represents an actual improvement in postgraduate education. The second premise was that these sociological changes had already been effected. This is, of course, a premise contrary to fact; they have not yet been effected, and presumably some time will be necessary for such a complete swing of the pendulum. This is fortunate, because it gives us the time to educate, the time to enlist allies, the time to prepare for the Brave New World.

Conclusions

No one of us possesses the final answer to this perplexing problem as to how we shall maintain our current standards of postgraduate training in the face of shifting socioeconomic trends. But though no one possesses the answer, all can benefit by this mutual discussion. For whatever the shape of the future, however uncertain it may appear, of one thing we can be sure: There will always be alert, intelligent young men asking for special postgraduate training; the form such training takes may alter significantly, but the demand will undoubtedly continue. And our obligation to these young men cannot be fulfilled by discussion alone; it must be fortified with positive and decisive action. The time available for reeducation and reorientation must be actively utilized. Our flank could be turned, and while such a change would be socially desirable, from the point of view of residency training

we must be adequately prepared. We must not assume that the "status" will remain forever "quo." The position that the ostrich adopts is still ludicrous.

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The following chiefs of services participated in the survey: W. E. Brown, University of Arkansas Medical Center; M. E. Davis, the Chicago Lying-In Hospital; R. R. deAlvarez, University of Washington School of Medicine; R. G. Douglas, the New York Lying-In Hospital; F. R. Lock, Bowman-Gray School of Medicine; C. E. McClennan, Stanford University School of Medicine; E. W. Page and E. W. Overstreet, University of California Medical Center; and J. R. Wilson, Temple University School of Medicine.

References

1. Faulkner, R. L.: Changing Trends in Graduate Training, Fifth Annual Thompson Memorial Lecture, Cleveland, Jan. 22, 1958. Saltzstein, H. C. Present-Day Problems in Intern–Resident Education, Harper Hosp. Bull., p. 182, Sept.-Oct., 1957.

2. Ravdin, I. S.: Problems of Surgical Residency Training, J. A. M. A. **165**:1373-1376 (Nov. 16) 1957.

3. Zollinger, R. M.: Changing Manner of Surgical Education, A. M. A. Arch. Surg. **75**:313-319 (Sept.) 1957.

COMMUNITY HOSPITAL AND GRADUATE EDUCATION TODAY

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and
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The term "community hospital" has been used in most instances to indicate a hospital which serves a given center of population. The great majority of such hospitals are in small or medium-sized communities in which no medical school is located. For this reason, the word "community" has often been used instead of "non-university–affiliated" or "nonteaching" in describing the work of such a hospital, since it is much more convenient than "non-university–affiliated" and, to most of the staff of a large proportion of such hospitals, occupied as they are in the education of interns and residents, the term "nonteaching" is somewhat offensive. For these reasons, the words "community hospital" will be employed in this communication to mean a hospital which does not receive medical undergraduates for regular clinical instruction nor have any direct ties with medical schools. Many of them, of course, are privileged to have physicians from the faculties of nearby medical schools as occasional or even regular speakers at meetings and conferences.

With the technical advances in diagnosis and treatment that have taken place in recent decades, the practice of medicine in the United States has, of necessity, become primarily hospital practice. If we wish to judge its quality, we must examine medicine as practiced in community hospitals. This is because it is to community hospitals that most Americans go when they are sick. Table 1 illustrates this fact. It indicates that throughout the United States there are almost four times as many beds in community hospitals as in hospitals affiliated with medical schools (the so-called major and minor teaching hospitals). Approximately half are in hospitals engaged in the training of interns. In the New England states, the ratio of beds in these hospitals to beds in the university–affiliated group is even higher. In this area, only slightly more than one patient in five is cared for at a hospital with university affiliation.

In order to be able to make and report a rather detailed study of community hospitals and because of an intimate acquaintance with these hospitals in the New England area, we decided to confine this study to this region, which, it can be assumed, is fairly typical of the country in general.

Organization of the Community Hospital

As is shown in table 2, there are almost four times as many hospital beds in community as in so-called teaching hospitals of the major and minor variety. Of these community hospitals, slightly more than half the beds are in the 53 hospitals that support approved intern-training programs. In order to evaluate the educational facilities that are presented to the interns in these hospitals, we have received from all the 53 hospitals detailed descriptions of their educational programs and have personally visited almost all of them. This study was begun a year and a half ago, and during that time a number of the hospitals have expanded and improved their programs. As of August, 1957, the situation is as follows:

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Read before the 54th Annual Congress on Medical Education and Licensure, Chicago, Feb. 10, 1958.

Eight of these hospitals employ full-time directors of medical education. In addition, there are two full-time directors who serve more than one hospital in this capacity. In 25 hospitals, the director of medical education is on part-time duty (this includes the two mentioned who divide their services between two or more hospitals). In 20 hospitals, the house-staff training is under the supervision of intern education committees.

TABLE 1.—*Hospitals in the United States in Relation to Internships and Medical School Affiliation*

	Hospitals	
	No.	Beds
Approved*	2,645	479,608
Unapproved	2,654	106,890
Total	5,299	586,498
With internships		
Medical school affiliation	200	104,291
No medical school affiliation	600	173,215
Without approved internships	4,499	202,162

* Joint Commission on Accreditation of Hospitals.

In all of the 53 hospitals, bedside teaching by the attending staff on regular rounds is stressed as the most important part of the program. Fifty have special teaching rounds in addition. Bedside or case teaching, of course, is the most important part of the educational program of a hospital. We will all agree that it is at the bedside in intimate discussion with the attending physician that the intern really learns medicine. Some community hospitals have gone so far as to omit didactic lectures, but most directors of medical education believe that these are useful because, besides being of some value to the house staff, they serve to keep the attending staff interested in the program and in preparation for their presentations they must keep up their own studies. Clinical conferences, however, in which the house staff takes an active part, are certainly of much greater value than lectures which, like medical movies, represent the type of spoon-feeding requiring no effort on the part of the hearer, which leaves but little permanent impression.

Pathology and clinical pathology are taught at regular conferences in 48 hospitals, and in a large proportion of these the intern serves a term in the laboratory, where he learns the technique and significance of the most important tests, as well as assisting at postmortem examinations. In 51—all but two—the radiologist holds regular teaching conferences for the house staff, in addition to giving practical instruction on the films that are taken in the course of the care of ward and private patients. In all but one of the hospitals, regular clinicopathological conferences are held. Interns take an active and responsible part in all conferences in all the hospitals. Fifty of the hospitals invite distinguished speakers to address their staffs at regular intervals. Thirty-six have journal clubs, and 39 have some type of affiliation with other institutions, many of these being university hospitals, to enhance the value of the experience offered to their interns. Twenty-six of the hospitals also had approved residency training in one or more specialties as of the summer of 1957, and probably the number has been increased.

From this, it can be seen that a real and effective effort is made in all the community hospitals of New England to give interns good professional training. It is, of course, easy to say that a hospital can have a good program on paper which it does not really carry out. This is true, but there is no doubt in our minds that in almost all of the hospitals that we have visited the program on paper is a program in fact, and in hospitals that we have not visited we have every reason to believe by our knowledge of individuals in close touch with these hospitals that a similar situation exists.

The Internship

As was pointed out two years ago by Stone,[1] it may be added that in the community hospital the intern comes into more intimate contact with patient's families and, under supervision, has a higher degree of personal responsibility for patient care than is the case when he works at the bottom of a hierarchy of assistant, junior, and senior residents, assistant, junior, and senior attendings, a professor or two at the top, and any number of intercurrent clinical and laboratory investigators. Omission of the internship as a general improvement in graduate training had previously been suggested by Leveroos [2] on the ground that the intern, between the clinical clerks below him and the residents above, holds an unenviable position in which his responsibilities and training are not always too

TABLE 2.—*Hospitals in New England in Relation to Internships and to Size and Affiliation*

	Medical School Affiliation		No Medical School Affiliation		Total	
	No.	Beds	No.	Beds	No.	Beds
With internships	15	6,449	53*	14,450		
Beds, no.						
100-199			19	3,163		
200-299			18	4,459		
300-499			12	4,342		
500+			4	2,486		
Without internships	18	2,441	211	15,223		
Totals	33	8,890	264	20,673	297	38,563

* Total is 54 as of Jan. 1, 1958.

valuable. In the little journal entitled *Resident Physician* we find this statement, with which we are inclined to agree: "In spite of the fact that increasing responsibility is given to the house officer as he ascends through the ranks of intern, assistant resident, resident, and senior resident, the supervision is so great that at times it even tends to squelch initiative and self-confidence." As Stone

emphasized, these essential qualities can be developed and an intimate personal acquaintance with sick people obtained in the community hospital internship. This should tend to make the young physician a better doctor and give him perspective and understanding which will serve him in good stead if and when he goes on to specialty training in a residency. In the community hospital, then, he learns to see the patient as a sick human being who is definitely dependent on his skill and judgment, not merely as an interesting and instructive problem in abnormal physiology or biochemistry.

It seems somewhat paradoxical that, with more than 75% of patients in the United States being cared for by nonuniversity hospitals, these hospitals have decreasing numbers of American medical school graduates as interns and residents, while each year finds increasing numbers of medical school graduates remaining under the maternal wing of the university hospital of their own or another medical school.

It has been admitted by some medical school faculty members who also are chiefs of their respective services in university hospitals that they have increased their quotas of interns, so that if they fail to secure a maximum number they may continue unhampered because they still secure an adequate number of interns. Those of us who spend a considerable amount of time in university as well as nonuniversity hospitals feel that most university hospitals are overstaffed and most nonuniversity hospitals are understaffed.

A frequently suggested remedy for the above situation is that all nonuniversity hospitals worthy of a house staff should be affiliated with medical school centers on a clinical clerkship, internship, or resident training basis. It is admitted by most medical schools that this would be impracticable or even impossible, because medical school faculties in general are already understaffed and overworked without this additional responsibility.

Where, then, can we find reasonable agreement and a workable solution? We would suggest that medical schools search out for their interested graduates those rotating internships in nonuniversity hospitals where a well-trained, unselfish, and devoted group of clinicians are willing to spend time and effort in the teaching and supervision of the young graduate. Such information is readily available through the office of the Council on Medical Education and Hospitals of the American Medical Association and is kept up to date by frequent inspection of the programs of all hospitals that expect to retain such approval. It should be recognized by all concerned with the above that no system will work effectively unless all groups participating in these phases of medical education are dedicated to the principle of constant improvement of medical training. The medical school could and should assume the role of guiding toward such rotating internships at least those students who wish to prepare for the general practice of medicine. We can say also, without reservations, that most practicing specialties will provide better patient care if they also have had the broadened perspective which comes with a good rotating internship.

At the present time, few medical schools give their third or fourth year students any glimpse of general practice with carefully selected general practitioners on the medical school faculty or an approach to rural medicine by way of the preceptorship. Having had no contact as a medical student with the above, it is obvious that very few medical students will choose this type of practice, not realizing the joys the rural physician may find in being a citizen as well as a physician in the lesser populated and perhaps more widely scattered areas where the greatest need for practitioners exists today.

It is our opinion that any medical school graduate who expects to see and treat patients certainly could benefit by a rotating internship. This is statistically supported by the findings of the study of the Advisory Committee on Internships [3] wherein (of those answering a questionnaire covering the graduates of medical schools in the United States in 1937 and 1947) 91.6% of the 1937 graduates having had rotating internships would still choose such an internship and 93.5% of the 1947 graduates having had rotating internships would still choose such an internship, while almost 50% of those having had straight internships would, in retrospect, have chosen rotating internships. This opinion, it will be noted, came from both a pre-World War II and a post-World War II graduating class. It, however, should be admitted that to force medical graduates completely into any one type of internship (be it straight or rotating) would create a serious schism between medical schools and organized medicine. For those medical graduates who expect to spend their lives purely in the research laboratory or who perhaps hope to become "full-time" in academic medicine, there is a place for the straight internship. For the great majority of medical graduates who wish to practice medicine, however, the rotating internship offers an invaluable opportunity to broaden perspective and even to assist in a subsequent choice of specialty.

Internships in community hospitals are all of the rotating type. As has been indicated, it is in community hospitals that the greater part of medicine in the United States is practiced. Half of the beds of these hospitals are in institutions that support approved intern training. But only with a group of interns on the job can the community hospital do its best work for its patients. In other words,

service is balanced with training in the ideal situation. Where the intern and resident are led to believe that the hospital is primarily, not secondarily, an institution to give them an educational experience, the whole philosophy of medicine breaks down. Such a conception does not produce the best type of physician, and the ideal is certainly a lower one than that in which the intern at all times is made to feel that good patient care is always the primary objective. When we hear, as we have, in a good so-called teaching hospital the resident say, "I didn't admit him, for his problem didn't seem very interesting," we shudder!

Alert, eager, and industrious interns not only furnish better care to the patients but provide a constant stimulus to the attending staffs, who, in teaching them, of course teach themselves and thus, of necessity, improve their own work. If we can say, then, that a house staff is necessary to produce the best of patient care in a hospital, let us ask where the smaller community hospitals obtain their interns. We all know that there are 4,000 or 5,000 more approved internships in the United States than there are American and Canadian trained graduates available each year to fill them. The answer, of course, is that the hospitals employ graduates of foreign medical schools. Most community hospitals have received few interns through the matching program (table 3), and, in the smaller hospitals of this group, well over 90% of the internships must be filled by foreign graduates or remain empty.

It has been stated from the "ivory towers" of medicine that many such hospitals, in employing these physicians as interns, exploit them by utilizing their services, giving them no real training in return, and thus turn them out to be licensed and to fall into a group of second-rate practitioners who are a menace to the American public. While this may be true in rare instances, particularly in hospitals which employ such physicians as paid house officers and not in approved internships, the material that has been presented makes it clear that definite progress is being made in building up adequate intern training experiences in practically all the community hospitals of New England in which there are internships that have been evaluated and approved by the Council on Medical Education and Hospitals. We have no reason to suppose that the situation in the New England states is different from that elsewhere in the country.

It is true that many poorly trained foreign physicians apply for internships in the United States. Hospitals have had to evaluate candidates for appointment with great care. Many of them, however, have developed effective techniques and make but few errors. The situation will be greatly improved when the screening examinations developed by the Educational Council for Foreign Graduates have been put into effect. This will indeed be a step forward. In the meantime, it is of interest to recognize that a number of well-qualified physicians have been arriving and enrolling for the rotating internship that is a necessary first step for most of them. There are also a number of physicians who come to this country on exchange or student visas, and most of these will return to their homelands. One can mention here the work of the Ventnor Foundation, administered by Dr. and Mrs. Hilton Read, of Atlantic City, N. J., under which selected graduates of German universities are brought to America for a year's internship in community hospitals and the similar program of the Unitarian Service Committee, which brings in young French physicians. There is also a large group of Hungarian refugee doctors, some being highly qualified specialists, who are serving in routine rotatng internships at the present time. In one small community hospital, the intern staff includes a pathologist of eight years' experience, an orthopedic surgeon with an equally long training in his field, a radiologist with seven years of work in his specialty, a surgeon who has served four years as surgical registrar in British hospitals, an Argentine practitioner with three years in general practice, a recent Harvard fellow in cardiology, who is a graduate of the University of Milan, and a graduate of Athens University with three years of pediatric training (two of them in the United States). In another community hospital, the intern staff is 100% British-trained and compares favorably in every way with a similar group of American-trained individuals. Not every hospital has had as good fortune in choosing its house staff, but it is clear that, with careful selection, an acceptable group can be secured by most of them from the many applications which are received.

TABLE 3.—*Results of Matching Plan in Community Hospitals of 100-200 Bed Capacity*

	Interns		
		Matched	
	Sought	No.	%
1955	89	6	6.7
1956	98	4	4.4
1957	91	11	10.0
Totals	278	21	7.5

Residency Training

It is not our intention to deal at any length with residency training in community hospitals. We are of the opinion that residencies in general practice in which the resident can go on to a two-year rotating training in which he receives a high degree of responsibility for patient care and can

achieve real competence in various fields of practice are best developed in carefully selected community hospitals. Residencies in the specialties, we feel, can also be maintained on an educational level equivalent to that of the university hospitals in some of the larger community hospitals. In the smaller institutions of this group, there are occasionally departments, such as anesthesiology or pathology, which can offer an excellent experience to the resident, and, as was recently pointed out by one of us,[4] smaller hospitals can combine to offer good training in one of the major fields, if their work is carried on under central supervision. Such a combined three-year medical residency in three community hospitals in New England has been approved by the Residency Review Committee in Internal Medicine and is now in operation in Rhode Island. It is also our opinion that all residency training in community hospitals should be carefully and frequently evaluated by the authorities, as in certain instances we believe it is below standard. Where university supervision is possible or rotation of residents from well-established hospital programs can be arranged, this is certainly desirable. We are also of the opinion that residencies should not be established without the coexistence of internships, for, under these circumstances, the residents carry the routine duties of interns and lose the opportunities for special study and training which they should have.

Comment

Community hospitals which deal with acute disease carry most of the patient load in the United States, and half of their beds are in hospitals which support approved internships. In this way, these hospitals are developing educational programs of real merit, which they are constantly improving. These hospitals are forced to fill their positions to a great extent with foreign graduates, many of whom are highly qualified. When the new screening examinations for foreign-trained physicians entering the United States are in operation, the problem will be greatly simplified and the hospitals protected from mistakes in the appointment of physicians, which at present are occasionally inevitable.

As the situation now stands, it seems clear that university authorities should take a more active part in the situation than they do. True, certain of them have made definite moves in this direction. The work of New York University, the University of Rochester in its relation to the Rochester Regional Hospital Council, and several others could be cited. To what extent these moves will prove of practical value remains to be seen. University affiliation in name only is not of much help, and we are aware of at least one excellent community hospital whose program has been much better now that the quite inadequate "affiliation" with a great university has been discontinued. It would seem however, that a plan by which an American student, particularly one intending to do general practice, could be encouraged to go to a community hospital for an internship in which a university is willing to take some responsibility would result in better training for the individual and better medicine in the hospitals involved. If this were extended, as proposed by Stone,[1] to the point of limiting internships to community hospitals and residencies, for the most part, to university hospitals and certain larger community institutions, we believe, as does he, that the end result would be better medicine, both by general practitioners and by specialists.

Summary

The community (non-university-affiliated) hospitals care for more than three-quarters of patients hospitalized for acute disease and injury in the United States. Approximately half of the hospital beds in community hospitals are in institutions which support Council-approved internships.

A study of the 53 hospitals in New England which fall into this category shows that they all are constantly improving these programs. Eight have full-time and 21 have part-time directors of medical education. In order to fill their quotas, these hospitals have to appoint a large number of foreign-trained physicians. In the smaller ones (of 100 to 200 bed capacity) this approximates 95%. Many well-trained foreign graduates are available, but the selection is difficult and the establishment of the examination by the Educational Council for Foreign Graduates will afford needed help and protection to these hospitals.

Because of the advantages to the intern of the training opportunities in community hospitals, a greater interest in these hospitals is recommended to medical school authorities. An internship in one of these hospitals offers the best training for general practice and an ideal background for the physician who intends to embark on a residency in one of the specialties. University authorities would be well advised to recommend such training to a large percentage of their graduates.

164 Summit Ave. (Dr. Burgess).

References

1. Stone, H. B.: Filling Gap Between Academic Medicine and Medical Practice, J. A. M. A. **160**:1298-1303 (April 14) 1956.

2. Leveroos, E. H.: Does Internship Have a Place in Modern Medical Education? J. A. M. A. **158**:1164-1166 (July 30) 1955.

3. Report of the Advisory Committee on Internships to the Council on Medical Education and Hospitals, J. A. M. A. **151**:499-510 (Feb. 7) 1953.

4. Burgess, A. M.: Resident Training in Nonuniversity Hospital, J. A. M. A. **161**:24-27 (May 5) 1956.

POSTGRADUATE SURGICAL TRAINING AND THE CHANGING ECONOMIC STATUS OF PATIENTS

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Surgery is the first of the branches of medicine to be severely hampered in its graduate teaching by the changing economic status of patients. Halsted introduced to the United States the present type of residency training, which is modified from the German system. This type of training, now adopted by most other branches of medicine, provides gradually increasing experience and responsibility until the final year, when complete or nearly complete responsibility is given to the resident. Surgery is the first specialty to be seriously affected, because voluntary surgical fee insurance is the most popular type of medical fee insurance today. Thus, surgery, the most popular type of graduate medical training, is the first specialty to have its graduate medical training affected by the changing economic status of patients. It is also obvious that, when in the future there is complete or nearly complete coverage of all individuals by professional fee insurance, surgery also will be the most seriously affected in its training program.

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Placing of Responsibility

In medicine, pediatrics, and many other medical specialties, responsibility to a large degree can be given to an intern or resident. This can be done without seriously jeopardizing the attending physician's ethical, moral, and legal responsibilities to the patient. This is not so in surgery. In most of these medical specialties the results of therapy hinge primarily neither on what happens in a certain period of minutes to several hours nor on the technical skill of one individual. The operative part of surgery is only a relatively small part, but no one will deny that it is important. That direct operative experience is most important in any acceptable surgical training program has been recognized by the American Board of Surgery by its refusal to continue to give complete credit for work done by residents in those institutions which do not provide progressive operative experience and responsibility for their residents. On these points in a surgical program, (1) the rapid disappearance of the ward service patient, and (2) the inability to use private patients, hinge various ethical, moral, and economic problems.

For those who would say that these problems are not for those in the smaller community hospitals but are for those in the major and minor medical teaching hospitals, I would remind you that since 1956 there have been more students of medicine in internships and residencies than there have been in the medical schools. This means that one in seven physicians in the United States today is taking medical postgraduate training—and the number is increasing, not decreasing. The medical schools and their associated teaching hospitals can take care of only a proportion of this postgraduate training program. These postgraduate students of medicine, the interns and residents, are looking for the best possible training, the best graduated intern and residency experience that they can get. A number of smaller hospitals recently have hired full-time or part-time educational directors, and some have established research facilities, including animal quarters, to help meet some of the residents' demands for a full, rounded training. As has been pointed out many times, such an educational program also improves patient care. This is not a medical school problem alone. This is a problem for every hospital that hopes to have a good intern and resident program. One of the important questions today is, "Who pays for this additional program?" With the development of the insurance programs, the private patient no longer helps in a major way to support the total effort of the hospital as he did a few years ago. Who does now or who will in the next few years pay for this expense of the hospital? Will it be the rapidly disappearing large donations, the many friends of the hospital, the attending doctors, the Community Chest, the insurance companies, the federal government, or each individual consumer of medical care?

As each hospital attempts to solve its immediate problems of today, it meets many frustrations. As I see it, the medical profession has no one but itself to blame for these current economic problems. Every insurance group has consulted with doctors before embarking on a health insurance program. Have we given them a true picture of the situation? Did we know then what the situation would be like today? And, more important, do we know exactly what the situation is today?

Many county and state medical societies and insurance companies, Blue Shield programs as well as state laws, take the stand that the individual who signs the insurance forms for the surgical fees indicates by his signature on the form not only that he was responsible for the patient but that, in addition, he performed the operation. It becomes quite evident that the senior resident cannot morally and ethically sign these forms for a patient on whom a qualified assistant resident operated. Also, an attending surgeon cannot do this for any of the ward-service patients operated on by any of the residents, even in his presence or with his assistance.

Finally, an attending surgeon cannot—or, in a strict sense should not—sign such an insurance form for his own private patient who was operated on by

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a resident with the attending surgeon acting as the first assistant. Also, when a resident does an operation on a private patient of an attending surgeon without the patient's knowledge, the question of ghost surgery is raised, regardless of whether the attending surgeon was present.

Reasons for and Outmoding of Regulations

Some of the rules and regulations of some local, state, and national societies and associations adopted by many insurance companies and made into law in some areas, which were very sound and natural developments, have under the present situation become seemingly incongruous. I shall mention only two of the factors that played some part in the development of these rules, regulations, and laws which we now find unintentionally restricting.

Unhappily, both of these factors that I mention are distasteful. The first factor developed because of the unscrupulous practices of some of our colleagues in the medical profession, namely, the individual who collected for his own pocket the insurance fees for patients whom the residents treated and possibly operated on and, occasionally, for a patient whom the collecting physician never saw. That this is wrong needs no further amplification. The second factor developed from the attitude of some physicians, first, that the cost of medical research and teaching is no concern of theirs or of their patients and, second, that every dollar that they can gather into their own pockets is very definitely the concern of the individual doctor.

Those doctors who express or give the impression of the attitude that they have completed their medical training, are in private practice, and, therefore, have no concern for the welfare patient, with medical research, or with training, are not true members of the profession in the light of the oath of Hippocrates. They also ignore the estimate by Gregg that probably 90% of their patients are alive today, rather than 10%, as a direct result of medical research. Furthermore, they do not realize that medical research is now in its infancy.

For those who believe that every available patient dollar should go to the individual practicing, non-research-minded, nonteaching doctor and that not a single one of these dollars should go to research and teaching, I believe that information provided by Dr. William Grose is pertinent. In the state of Maryland there are 2,200 doctors. The sum of $128,000 was earned in one year by the two medical school hospitals in that state by reason of the treatment they did render to patients. Even if this total sum were divided, it would amount only to $58.65 for each doctor in the state of Maryland. He further points out that this is not potential money taken out of the pockets of the individual doctors but that it represents available money that came through a third party, or insurance, from a class of patients who previously contributed nothing toward the cost of their care. Years ago, when the ward-service patients could pay nothing, there was no argument about the fact that the teaching hospitals could take care of these indigent, ward-service patients. The same is true now of those areas where there are many indigent, ward-service patients. Again there is no argument about who cares for these patients.

Government Subsidy

A very good question, to my way of thinking, is this: Would the American people who were so eager to pay their own way by purchasing voluntary hospital and professional fee insurance from individual companies and groups, rather than sit back and demand socialized medicine, also be eager to individually help foot the bills of research, development, and teaching, rather than to depend in the future almost entirely on government subsidy? I do not believe it is the intention of the federal government to provide all or nearly all of these costs. It is, of course, quite proper and indeed a necessity that the federal government, to a large extent, subsidize medical research and teaching, but should it provide the major portion, nearly all, or all of this subsidy? At the present time, the federal government provides directly or indirectly 50% of the costs of research and development of medical schools in the United States. Recently, I heard that in one school this amounted to almost 100% of their cost of research and development. Those of us who have received some subsidy from the federal government are grateful for this assistance and will continue to look forward to continued support from this source in the future—and, of course, others should do likewise.

What is being done to meet these problems? Of course, those residency programs which are most seriously affected by a lowered number or a complete lack of ward-service patients are the ones most interested at the moment. It would appear that in certain areas in the Midwest and in the South there is no serious problem. Where the shoe pinches there is much interest and activity, where the shoe is tight there is interest and a little activity, and where the shoe fits well there is neither interest nor activity.

Adequate Surgical Training

Through discussions and correspondence with many surgeons throughout the country, it appears to me that established surgeons are very much determined to give adequate surgical training to young men. Apparently, their determination to train young surgeons is so great that they are training them without regard for some of the rules, regulations, and laws that we now find incongruous. This training includes not only graduated experience in the over-all management of surgical patients but also, very definitely, graduated operative experience extending over several years. Note that I did not say the last year of residency; you cannot teach a young surgeon to operate in one year.

I think it would be fair to assume that, of the major and minor medical school hospitals and also a large number of hospitals not affiliated with med-

ical schools, one in three has a problem in regard to a sufficient number of ward-service patients for adequate surgical residency training. Probably an additional 1 in 10 has an extremely serious problem in this regard. It would appear that the nonmedical school hospitals are just as concerned about their shortage as are the medical school hospitals.

Dr. I. S. Ravdin has suggested that the need for patients for surgical training can be satisfied by military and Veterans Administration hospitals, which are frequently filled with patients who do not have service-connected disabilities. He points out that this will make it possible, without any lowering of standards, to train more young men in general surgery while also providing the experience of general surgery that is essential for the training of the surgical specialist. Certainly a closer relationship between civilian, military, and VA hospitals will help solve the problem of patient shortage.

To what extent are private and semiprivate patients being utilized for surgical residency training in lieu of ward-service patients? I would not be at all surprised if one or more attending surgeons in 50% of the hospitals in this country occasionally, if not regularly, do allow competent residents to operate on some of their private patients. This does not mean that all surgeons are doing this, but very definitely it is being done all over the country. I am sure that in most instances the attending surgeon is assisting the resident at the operation and, therefore, is available to give advice and is able to complete the operation if necessary. We would all agree that he should protect the best interests of the patient and, of course, of himself. In an even larger proportion of hospitals, the surgical resident is often allowed to open and close the wound as part of his operative surgical training. Those attending surgeons who do allow residents to operate on the attending surgeon's semiprivate and private patients should know of a relatively recent statement approved by the Board of Regents of the American College of Surgeons. This statement reads as follows:

> Since the informed consent is a moral and legal prerequisite to the performance of a surgical operation, every patient about to undergo surgical operation, or his legal guardian, should have full and complete knowledge of the identity of his surgeon. Only from strict observance of this principle can the surgeon meet his obligation to this patient, whether the patient be private or not. Such conduct is essential to sound surgical training. Private patients can be used honorably and effectively for residency training only when the patient is fully aware of the extent of the resident's responsibility for his care and his degree thereto.
>
> The operation itself is only a part of the care of surgical patients, and this should not be overemphasized in the training of residents. It is equally important for residents to become familiar with sound principles of preoperative and postoperative care, the application of the basic sciences to surgical problems, and the use of suitable methods of diagnosis. Furthermore, the satisfactions of the patient-physician relationship are rightfully a part of the resident's experience and serve to develop the moral and ethical standards on which the art is based.

Several institutions have established the senior resident as a junior attending staff member, who, therefore, is entitled to have his own private patients while he is still in the residency training program. Such individuals usually have contracts with the hospital or service which indicate that the fees of their patients are retained by or turned over to the service, the department, or the hospital for enhancement of the surgical teaching and research programs.

Professional Fees

In many hospitals, the surgeons and administrators feel that because of existing laws, rules, and regulations they cannot collect any of the professional fees. In those hospitals where fees are collected, either the physician collects these fees or the residents collect them. In most instances the income is reported on an individual basis and then is written off as a charitable contribution to the service, department, hospital, or special research development fund.

In some areas the local income tax people do not require that these moneys appear as income on an individual's income tax return. One hospital has gone so far as to obtain clearance from the Department of Internal Revenue in Washington which allows these funds to be omitted from the individual's income tax return provided he has signed an agreement on file with the Department of Internal Revenue.

It is interesting to know that some hospitals take the professional fee to pay part of the costs of hospitalization when the hospitalization insurance does not cover the complete cost of hospitalization. Any remaining excess of professional fee is either returned to or retained by the insurance company or plan, deposited in the surgical department, or deposited in a hospital or medical school fund to further the ends of research and teaching. Why should the residual professional fee, under some laws, necessarily be returned to or be retained by the insurance company or professional insurance plan? Why should any hospital be allowed to take part of the professional fee to pay patients' hospitalization costs and yet not be able to use the remainder of the professional fee to support research and teaching efforts of the professional staff?

Conclusions

It is apparent that our changing economic order in respect to voluntary and involuntary health insurance has produced many annoying growing pains. Because we are discussing an economic change, the ugly subject of money has been aired. I have emphasized that, in the future, in an order in which nearly everyone is completely covered by professional fee insurance, surgery, by the very nature of its important therapeutic tool, the scalpel, suffers the most under present rules, regulations, and laws. Also, surgery is the first to feel the full impact of the increasing rate of coverage by professional insurance.

It is at the same time apparent that we will train young surgeons for the future as we have in the past. It may not be by the system that we know as the Halsted system of residency training. Whether these future surgeons will receive part of their training on ward-service patients who pay their hospitalization and professional services by means of insurance or whether the surgical trainees receive this small but important part of their training entirely from semiprivate or private patients is up to the decision of the medical profession.

If we, as a professional group, cannot agree on a clear road for the future, the decisions will be made by other interested groups or by other forces. In the words of John R. Paine, "The private patient must be redefined, and medical ethics and morals must be revised. The sooner the medical profession in particular, and the public at large, realize this fact, the better off everyone will be. If this is not the case, the system of surgical training as we know it, based on the graduated residency, is going to collapse from a lack of ward-service patients."

630 W. 168th St. (32).

CLINICAL NOTES

NEPHROSIS OCCURRING DURING TOLBUTAMIDE ADMINISTRATION

Charles Schnall, M.D.
and
Jacob S. Wiener, M.D., Philadelphia

In view of the great popularity and increasing use of orally given hypoglycemic sulfonamides, the occurrence of the following case of nephrosis which was seen by one of us (C. S.) during the administration of tolbutamide (Orinase), the first such case to be noted, is of interest.

Report of a Case

A 41-year-old woman had an appendectomy in 1936 and a cholecystectomy in 1950. Otherwise, she had been generally in good health during the last 10 years while under the care of one of us (C. S.). In March, 1957, a vaginal hysterectomy was performed for removal of uterine fibroids associated with menorrhagia and metrorrhagia. During this hospitalization, she was found to have mild diabetes, and her condition was standardized on therapy with 10 units of NPH insulin and a 1,200-calorie diet, given from March, 1957, until July 1, 1957. During this time she received no other medication and suffered no other illnesses. On July 1, 1957, she was started on tolbutamide therapy, 6 tablets the first day, 4 the second day, and 2 daily thereafter. Insulin was withdrawn at this time. Tolbutamide was the only medicament given until the onset of her present illness on Sept. 9, 1957. Initially, blood sugar level determinations, urine examinations, and white blood cell counts and differential counts were done at weekly intervals, then at biweekly intervals. She suffered no infections or other illnesses from July 1 to Sept. 9, 1957.

On that date, two weeks after her last examination, the patient complained of headache, nausea, vomiting, dizzyness, marked puffiness of the face, and inability to pass urine. She was hospitalized at the Misericordia Hospital, Philadelphia, on Sept. 10, 1957. On admission, her temperature was 98 F (36.6 C), pulse rate 70 per minute, and blood pressure 102/60 mm. Hg. Her face was markedly edematous, and there was some presacral edema. The patient was extremely nauseous and irritable; she developed twitchings and was somewhat irrational. While in the hospital, she had marked oliguria for several days. She was maintained on intravenously given fluids, with careful attention being given to the electrolyte and acid-base balance. On Sept. 13, 1957, diuresis began. Marked improvement ensued, and the patient was discharged on Sept. 21, 1957, free from symptoms. During her hospital stay, her temperature, pulse, and respiration rates and blood pressure varied little and were normal at the time of discharge.

Laboratory Studies.—Results of urinalyses are given in the table. Blood urea nitrogen levels Sept. 10-13 were 40, 60, 40, and 25 mg. per 100 cc. respectively; on Sept. 16, the level was 19 mg. per 100 cc.

A complete blood cell count on Sept. 11 was normal. The serum carbon dioxide content on Sept. 10 was 20 vol. %. The serum chloride level on Sept. 10 was 92 mEq. and on Sept. 16, 107 mEq. per liter. The total serum protein level on Sept. 10 was 5.34 Gm. per 100 cc. (albumin, 3.87 Gm. per 100 cc., globulin, 1.47 Gm. per 100 cc.). The serum sodium level on Sept. 11 was 136 mEq. and on Sept. 16, 125 mEq. per liter. A phenolsulfonphthalein test done on Sept. 18 showed 11.6% excretion the first 15 minutes and 8.1% the second 15 minutes (total, 19.7% excreted at the end of 30 minutes). On Sept. 11 the total serum cholesterol level was 308 mg. per 100 cc., with esters 150 mg. per 100 cc.

Dr. James L. McCabe, medical chief at the Misericordia Hospital, stated in consultation, "This patient has an acute toxic nephrosis, most likely due to tolbutamide." When last seen on Jan. 2, 1958, the patient was asymptomatic and her blood urea nitrogen level, urinalysis, and blood pressure were completely normal.

*Urinalyses of Patient with Acute Nephrosis During Tolbutamide Administration**

Date	Sp. Gr.	Alb.	Bacteria	RBC	WBC	Epithelial Cells	Crystals	Casts	Output, Cc.
9-10									200
9-11	1.005	4+	few	2-3	82	mod.	none	occ.	400
9-12	1.004	4+	few	2-3	10		none		500
9-13	1.001	3+		few				occ.	1,250
9-14	1.001	2+		occ.	3-7				2,200
9-15	1.001	2+		few					4,270
9-16	1.001	1+		few	occ.		none	occ.	3,175
9-17	1.002	trace		few					3,750
9-18	1.002	trace		occ.	3-10				3,025
9-19	1.002	trace		occ.					2,550
9-20	1.004	trace		few					

* Color consistently yellow, reaction acid. Tests for sugar and benzidine were negative throughout.

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Comment

This patient had an acute nephrosis. She had been given no drugs other than tolbutamide and suffered no infections prior to her illness. To date, there have been no reports of renal complications after the use of tolbutamide.[1] In this case, the cause of the renal complication cannot be determined conclusively. However, the relationship of the nephrosis to tolbutamide use may be presumptive.

Summary

A woman with mild diabetes whose disease was of recent origin had been on tolbutamide therapy for two months when she developed an acute nephrotic syndrome. The patient recovered immediately on withdrawal of the drug. This suggests that there may be a presumptive relationship between tolbutamide and renal complications.

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References

1. Effects of Sulfonylureas and Related Compounds in Experimental and Clinical Diabetes, Ann. New York Acad. Sc. **71**:1-292 (July 10) 1957. Orinase, Brochure of the Upjohn Company, Kalamazoo, Mich., 1957. Breneman, J. C.: Clinical Use of Tolbutamide (Orinase) in Office and Home Care of Diabetics, J. A. M. A. **164**:627-633 (June 8) 1957. Oliver, J.; MacDowell, M.; and Tracy, A.: Pathogenesis of Acute Renal Failure Associated with Traumatic and Toxic Injury: Renal Ischemia, Nephrotoxic Damage and Ischemuric Episode, J. Clin. Invest. **30**:1307-1439 (Dec., pt. 1) 1951.

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RAPID DIGITALIZATION OF AMBULATORY PATIENTS WITH ATRIAL FIBRILLATION

USE OF INTRAMUSCULARLY GIVEN DESLANOSIDE FOLLOWED BY ORALLY GIVEN ACETYLDIGITOXIN

Emanuel Hellman, M.D.
and
Murray Port, M.D., New York

This study was undertaken in an effort to establish a safe method of rapidly digitalizing ambulatory patients, preferably in one clinic visit, by means of the combined administration of a parenterally and an orally given digitalis preparation and also to evaluate the feasibility of the intramuscular route of administration of deslanoside (desacetyllanatoside C, lanatoside D). It was prompted by the necessity of treating a large number of patients in an active cardiac clinic where available personnel was minimal and patient attendance irregular.

Material and Methods

In order to provide a means of measuring the effect of the drugs, selection was limited to patients with atrial fibrillation. The study includes 16 patients, 3 of whom received two trials with deslanoside. All patients had well-documented heart disease. Each was observed for a period of four weeks before the study was begun, during which time no digitalis preparations of any kind were used. The dose of deslanoside was 1.6 mg. in 16 trials and 1.2 mg. in 3 trials. In all cases this was given in one dose in a single injection intramuscularly in one buttock. The initial effect of the drug was taken as the time necessary for a 10% reduction of the control ventricular rate. When this occurred, maintenance therapy was begun with acetyldigitoxin in doses of 0.1 to 0.2 mg. (Maintenance therapy was begun on the same day in 12 of the 16 patients.) The effectiveness of such maintenance was judged by recording the ventricular rate at varying intervals for a period of two weeks. Electrocardiograms were taken in each case before injection of deslanoside and at intervals thereafter in order to check ventricular rates and to detect early toxic effects.

From the medical services of the New York Polyclinic Hospital and the Gouverneur Hospital.

Results

Initial Effects.—Adequate response, with a 10% reduction of the ventricular rate, occurred in 17 trials in 15 patients; one patient failed to respond to two separate trials. The time after injection at which initial effects were observed varied from 22 minutes to 75 minutes, averaging 32.7 minutes.

Maintenance Dose.—Of the 12 patients placed on maintenance therapy with acetyldigitoxin, 7 received a daily dose of 0.1 mg. and 5 were given 0.2 mg. Ventricular rates recorded at intervals over a subsequent two-week period were lower in the patients who received 0.2 mg. than in those who received 0.1 mg.

Pain at Side of Injection.—Of the 19 trials with intramuscular injection of deslanoside, pain at the side of injection was noted in 9 instances. This was classified as mild in two, moderate in two, and severe in five. In the severe cases the pain lasted from 2 to 10 days. If the two trials in which the pain was slight are omitted, there remain seven instances of moderate to severe pain; an incidence of almost 37%.

Toxic effects.—No toxic effects were noted.

Comment

Deslanoside has effects identical with those of lanatoside C, from which it is derived.[1] With intramuscular injection, effects are achieved about a half-hour slower than with the intravenous route, peak effects appearing in 60 to 90 minutes.[2] While it is generally recommended that the full dose of 1.6 mg. be given in divided doses, it may be given in a single dose without toxic effects.[3] In the cases herein reported, no toxic effects were observed in 16 trials with 1.6 mg. and 3 trials with 1.2 mg., despite beginning of maintenance therapy with acetyldigitoxin on the same day.

Although it is stated that deslanoside is suitable for intramuscular injection,[4] references to the incidence of pain at the site of injection are sparse. In this small series of cases, moderate to severe pain was noted in 37%. It is probable that the incidence of pain may be less if half the dose is given in each buttock rather than the entire dose in one buttock.

Summary

Digitalization by means of a single intramuscular injection of deslanoside (desacetyl-lanatoside C, lanatoside D) was carried out in 19 trials in 16 ambulatory patients, the dose being 1.6 mg. in 16 instances and 1.2 mg. in 3 instances. In 12 such trials, maintenance therapy with acetyldigitoxin was begun on the same day. Adequate digitalization was obtained in 15 of the 16 patients. No toxic effects were noted. Moderate to severe pain at the side of injection was noted in 7 of 19 trials, an incidence of 37%.

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References

1. Hoesley, J. B., and Luan, L. L.: Digitalis in Congestive Heart Failure, M. Clin. North America **41**:45-56 (Jan.) 1957.

2. Enselberg, C. D.: Treatment of Cardiac Arrhythmias, A. M. A. Arch. Int. Med. **95**:123-128 (Jan.) 1955.

3. Barrow, J. G.: Treatment of Paroxysmal Supraventricular Tachycardia with Lanatoside C, Ann. Int. Med. **32**: 116-119 (Jan.) 1950. LaDue, J. S. Intravenous Use of Digitalis Glycosides, South. M. J. **36**:124-133 (Feb.) 1943. Goldberger, E.: Heart Disease: Its Diagnosis and Treatment, Philadelphia, Lea & Febiger, 1951. Fahr, G., and LaDue, J. S.: Preliminary Investigation of Therapeutic Value of Lanatoside C (Digilanid C), Am. Heart J. **21**:133-150 (Feb.) 1941.

4. Winsor, T., and Khoury, N. J.: Treatment of Cardiac Arrhythmias, Postgrad. Med. **19**:101-117 (Feb.) 1956. Reference 2.

COUNCIL ON FOODS AND NUTRITION

Report to the Council

The Council has authorized publication of the following report. This article is part of a nutrition education program which is assisted by the Nutrition Foundation, Inc.

PHILIP L. WHITE, SC.D., *Secretary.*

METABOLIC DEMANDS AS A FACTOR IN WEIGHT CONTROL

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and
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The medico-actuarial height-weight tables of 1912 indicate definitely that the population as a whole gains weight with advancing years. For example, the average weight of a man 5 feet and 10 inches tall, aged 25, is 71.3 kg. (157 lb.), but of a man aged 55 years the weight is 78.6 kg. (173 lb.), a gain of 7.3 kg. (16 lb.). This evidence of actual gain in weight of the population may possibly give a clue to one of the causes of obesity.

From the New York University Post-Graduate School of Medicine (Dr. Pollack) and the Army Medical Nutrition Laboratory, Fitzsimons General Hospital (Messrs. Consolazio and Isaac).

What is universally accepted as the basic cause of obesity is an intake of calories in excess of metabolic demands. Obesity may result from an increased intake of calories in the presence of a constant output of energy, from a decreased output in the presence of a constant intake, or from any relative variation of the two. A great deal of attention has been given to the increased caloric intake aspect of weight gain. Undoubtedly this can be the principal cause of obesity, especially for those

who become obese before early adulthood. Obesity most often develops in adult life when eating habits have been fairly well established. One may question the fact that a decrease in caloric expenditure is important in the weight gain of this group. A review and analysis of the "calorie cost of living" is indicated to determine the reasons for this suspected decreased caloric requirement.

The following five main factors determine the "calorie cost" of life: (1) age, (2) body size, (3) sex (the three comprising the basal metabolic requirements), (4) physical activity—work output, and (5) type of food—specific dynamic action. These factors are listed in the order of their relative importance for all persons except those who do extremely vigorous manual labor. (In the United States, mechanical horsepower has replaced, to a large extent, human caloric expenditure for very heavy physical work.)

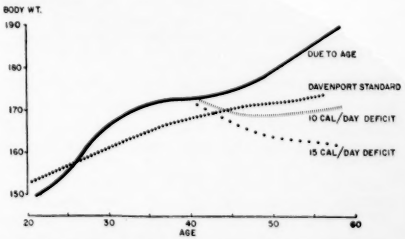
Basal Metabolic Requirements

For the average white-collar worker and housewife, the basal caloric requirements constitute one-half to two-thirds the total calorie requirements for the day. This is expressed frequently in the textbooks. They state, "Calculate the basal requirements and add 50% of this value to determine the total cost." If the basal requirements are such a large fraction of the total, it becomes necessary to analyze the basal caloric expenditure of adults.

The caloric requirement per unit of body weight starts to decrease shortly after birth. Up to about the age of 14 for females and 18 for males, the increase in body weight (growth factor) is greater than the metabolic decrement per unit of body weight. This results in an increasing total caloric requirement through adolescence, that equilibrates in a person at about the age of 25 when optimum weight is achieved.

The decreasing metabolic requirements per unit of body weight become manifest in the presence of a constant intake. According to DuBois, for a man, aged 25, the basal caloric requirement is 37.4 calories for each square meter every hour, and for a man, aged 55, it is 35.3 calories per square meter per hour.[1] A man 5 feet and 10 inches tall, who weighs 71.3 kg. (157 lb.), has a surface area of 1.87 sq. m., and a man of the same height who weighs 78.6 kg. (173 lb.) has a surface area of 1.91 sq. m. Thus, the man weighing 71.3 kg. at age 25 requires 69.9 calories per hour, and the man weighing 78.6 kg. at age 55 requires 67.4 calories per hour. In 24 hours they require, respectively, 1,678 calories and 1,618 calories. But if the man at age 55 had retained his weight of 71.3 kg., he would require only 66.0 calories per hour or 1,584 calories in 24 hours.

The figure shows a curve drawn from data obtained by the calculation of the small decrement in caloric requirements associated with the aging process for a hypothetical man, 5 feet and 10 inches tall, who consumes food providing 2,800 calories a day over a period of years. The basal caloric requirements are corrected downward for aging and upward for each increment in weight gain. The net result is a positive caloric balance. The value of 3,500 calories is used as the equivalent of one pound in body weight for conversion purposes. The curve is essentially S-shaped, with the plateau in the middle 40's age group. If one superimposes on this curve another one drawn from the age, height, and weight tables published by the Life Insurance Actuarials in 1912, it is obvious that the trend of the curve based upon averaged actual measurements of a large cross section of the population is almost identical to the hypothetical curve drawn from the assumptive data. The similarity in the curves allows one to present certain hypotheses with respect to the overweight person found in aging population groups.



Body weight increase on a constant intake, 2,800 calories per day, and constant expenditure, correcting for decreased metabolism due to age.

Small increments of positive caloric balance over a period of time can result in pronounced obesity. This increment can be due to decreasing basal metabolic requirements. When this age decrement is coupled with decreasing physical activity, a common phenomenon in the present day population, a marked gain in weight can result. A difference of 10 to 15 calories per day over a period of 15 years can cause a difference of 4.5 to 6.8 kg. (10 to 15 lb.) of body weight. It will be shown later in this discussion that the difference between sitting and standing is sufficient to alter caloric expenditure by this increment. By application of the same reasoning of small increment changes to actual physical work, it is possible to emphasize the importance of activity in a weight control program. Very little can be done to change the basal meta-

bolic requirements without upsetting the homeostatic mechanism upon which life depends. This leaves two possibilities to prevent the slow accumulation of fat: a decrease in calorie intake and an increase in the calorie requirements of the other factors, work and specific dynamic action.

Physical Activity Requirements

The energy expenditure of individuals may vary considerably. This is due to both a variation in the amount of work that they perform and in the individual variations in the calorie cost of such work. Certain components in the different work outputs of individuals are obvious and easily understood. A specific example illustrates this. Two men are working together to make a hole in a block of granite. One man stands still directing the cold chisel with a pair of tongs, while the other swings the heavy sledge hammer down onto the head of the chisel, picks it up, and swings again. Swinging a sledge hammer is a type of work that is independent of body size. The foot-pound expenditure depends largely on the size of the hammer and the distance through which it is swung. A small man will spend approximately as much energy lifting a sledge hammer as does a large man.

TABLE 1.—*Energy Expenditure in Walking as Affected by Velocity and Weight*[3]

Speed, Mph	Weight, Kg. (Lb.)				
	54.5 (120)	63.6 (140)	72.8 (160)	81.8 (180)	91 (200)
2.0					
Calories/min.	2.6	2.9	3.2	3.5	3.8
Calories/hr.	156	174	192	210	228
Calories/mile	78	87	96	105	114
2.5					
Calories/min.	3.1	3.5	3.8	4.2	4.5
Calories/hr.	186	210	228	252	270
Calories/mile	74	84	91	101	108
3.0					
Calories/min.	3.6	4.0	4.4	4.8	5.3
Calories/hr.	216	240	264	288	318
Calories/mile	72	80	88	96	106
3.5					
Calories/min.	4.2	4.6	5.0	5.4	6.1
Calories/hr.	252	276	300	324	366
Calories/mile	72	79	86	93	105
4.0					
Calories/min.	4.7	5.2	5.8	6.4	7.0
Calories/hr.	282	312	348	384	420
Calories/mile	71	78	87	96	105

The calorie cost of any type of activity that involves the whole body, such as walking, varies with the size of the body and, more specifically, with total body weight. In actual experiments a man weighing 61 kg. (134 lb.) who walked 3.5 mph spent 261 calories.[2] A man weighing 91 kg. (200 lb.) expended 366 calories walking the same distance at the same speed,[3] and a man weighing 99 kg. (218 lb.) expended 409 calories.[2] The addition of dead weight to the shoulder of an individual increases his caloric expenditure in the same order of magnitude. A man weighing 68.2 kg. (150 lb.) used 98.8 calories to walk one mile. Forty kilograms (88 lb.) of weight were then put on his shoulder, and the calorie cost of the mile increased to 142 calories.[4] It is no wonder that small people complain that they gain weight so easily.

It is a common fallacy to consider the speed of walking as an important factor in the calorie cost and to attribute the slowing down of the speed by the elderly person as contributing to the weight gain. Table 1 is based on the work of Margaria.[3] It demonstrates clearly that walking a mile, regardless of the rate of speed, costs essentially the same number of calories per unit of body weight. In fact, the cost is somewhat greater at the slower pace.

TABLE 2.—*Energy Expenditure in Various Activities*

	Calories/Min.	Calories/Hr.	Difference Between Each Preceding Activity, Calories/Hr.
Sleeping	1.09	65.40	...
Lying down	1.26	75.60	10.20
Sitting	1.35	81.00	5.40
Standing	1.50	90.00	9.00
Standing, light action	2.60	156.00	66.00

There are other seemingly insignificant differences in the daily habits of people that account for some weight gain differences over a long period of time. The differences in the calorie cost between lying down, sitting, standing quietly, and standing while moving in a limited area have been measured (table 2).[5] These differences may not seem large, but when multiplied by the total minutes during the day they loom larger. For example, there is a difference of almost nine calories an hour between sitting quietly and standing quietly. Those people who never stand still may burn 66 calories an hour more than their relaxed brother. In 70 hours the former burns the equivalent of one pound of body weight more than the other (calculate 3,500 calories per pound of body weight).

TABLE 3.—*Energy Expenditure in Traveling a Distance of 2.5 Miles*

	Speed, Mph	Time Consumed	Caloric Expenditure
Walking	2.5	1 hr.	210
Cycling	5.5	27 min.	122
Driving	25.0	6 min.	17

The mechanization of life in recent years has had an influence on the caloric expenditure. Some people have compensated by using this new leisure time for active sports, whereas others have not. For example, a man lives 2.5 miles from his work. Table 3 shows the caloric expenditure of walking, bicycling, or driving his automobile to work.[6] If cycling and driving are compensated for by adding

the caloric requirements of standing for the remainder of the hour, the results shown in table 4 are found.

A typist who is 63 in. tall and weighs 54.5 kg. (120 lb.) uses 87.7 calories per hour in using the standard mechanical typewriter.[6] The same typist using an electrical typewriter expends only 72.9 calories per hour. For this individual there is a difference of 14.8 calories an hour, and for six hours of actual typing there is a saving of 90 calories with the power typewriter. For a five-day week it amounts to 450 calories; in 10 weeks this can be the equivalent of a pound of body weight, assuming a constant intake.

A farmer driving a tractor with a standard steering wheel during cultivation of a field expends 85 calories per square meter per hour, but if he uses power steering, he expends only 68 calories per square meter per hour. For a man who is 5 feet and 10 inches tall, weighing 68.2 kg. (150 lb.), with a surface area of 1.85 sq. m., this means 157 calories versus 126 calories every hour; in an eight-hour day there is a difference of 250 calories. Taking an average expenditure of 3,000 calories per day, this is an 8.6% difference in total daily caloric requirement. This saving is small when compared to the caloric requirement of the farmer who walks behind his horse-drawn plough. He expends 400 calories per hour.

The difference in calorie expenditure between two men on a weekend can be considerable. One man plays 18 holes of golf, walking about four miles in three hours, and expends 950 calories.[6] The other man gardens for three hours and expends only 580 calories.[7] One man goes out in the evening and dances for an hour and sits and talks for two hours, spending a total of 400 calories; the other man just sits for three hours and spends 275 calories.

Table 5 is presented to show the variations in caloric expenditures with various activities. It must be pointed out that in certain activities such as

TABLE 4.—*Energy Expenditure in One Hour When Traveling a Distance of 2.5 Miles*

	Time Consumed	Standing, Min.	Caloric Expenditure
Walking	1 hr.	0	210
Cycling	27 min.	33	171
Driving	6 min.	54	97

walking the motion is constant and the expenditure uniform throughout the time. In other activities such as tennis and football the motion is intermittent. The values expressed are for the periods of motion only. For an hour of tennis, a player may be in motion only about one-third of the time; the rest of the hour must be calculated as standing only.

Summary

The importance of the calorie expenditure factor in the development of moderate obesity in the adult should not be minimized. It is important for persons to recognize that certain physiological changes take place in the human body that demand readjustment of the work and play habits or special attention to food intake. Small increments of excess intake and small decrements of decreased output together can be responsible for much adult obesity.

TABLE 5.—*Caloric Cost of Daily Living Activities and Sports in Men*[8]

Normal Activity	Cal./Min./ Sq. M.*	Sport	Cal./Min./ Sq. M.*
Sitting, normal	0.70	Football	5.04
Sitting, reading	0.70	Basketball	4.31
Sitting, eating	0.80	Ping-pong	2.42
Sitting, playing cards	0.83	Bowling	4.06
Resting in bed	0.68	Swimming	6.06
Standing, normal	0.81	Golfing	2.76
Standing, light activity	1.41	Tennis	3.50
Personal toilet	1.09	Squash	5.00
Shower	1.84	Table tennis	2.00
Dressing	1.84	Badminton	1.91
Making bed	2.64	Rowing	4.00
Shining shoes	2.11	Sailing	1.30
Mopping floor	2.67	Snooker pool	1.50
Walking indoors	1.68	Dancing	2.00
Walking outdoors	3.07	Riding	1.50
Walking upstairs	10.00	Boxing, sparring	5.00
Walking downstairs	3.80		
Kneeling	0.68		
Squatting	1.12		
Washing clothes	1.46		

* Based on basal metabolic rate of 0.59 calories per minute per square meter of surface area.

References

1. DuBois, E. F.: Basal Metabolism in Health and Disease, ed. 3, Philadelphia, Lea and Febiger, 1936, p. 157, table 24.

2. Brockett, J. E., and others: Influence of Body Size, Body Fat, Nutrient Intake, and Physical Fitness on Energy Expenditure of Walking, U. S. Army Medical Nutrition Laboratory, Denver, Report no. 177, March 19, 1956, pp. 1-7.

3. Margaria, R.: Sulla fisologia e specialmente sul consumo energetico, della marcia e della corsa a varie velocita ed inclinazioni del terreno, Atti dei Lincei **7**:299-362, 1938.

4. Consolazio, C. F.; Pollack, H.; Crowley, L. V.; and Goldstein, D. R.: Studies in Nutrition in Far East: V. Calorie Cost of Work and Energy Balance Studies, Metabolism **5**:259-271, 1956.

5. Brockett, J. E., and others: Energy Expenditure of Soldiers in Training Company, U. S. Army Medical Nutrition Laboratory, Denver, Report no. 212, 1957.

6. Passmore, R., and Durnin, J. V.: Human Energy Expenditure, Physiol. Rev. **35**:801-840, 1955.

7. Garry, R. C.; Passmore, R.; Warnock, G. M.; and Durnin, J. V.: Studies on Expenditure of Energy and Consumption of Food by Miners and Clerks, Fife, Scotland, 1952, pp. 1-70, London, Medical Research Council, Special Report Series 289, 1955.

8. Widdowson, E. M.; Edholm, O. G.; and McCance, R. A.: Food Intake and Energy Expenditure of Cadets in Training, Brit. J. Nutrition **8**:147-155, 1954. Reference 5.

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RADIATION HAZARDS AND THE RADIATION SYNDROME

INTEREST in radiation hazards has increased in recent years because of the new awareness of the possibility of somatic damage from exposure to small doses of penetrating ionizing radiations, evidence of an increase in the mutation rate of offspring from parents exposed to such radiations, and the increasing exposure to which the entire population is subjected.[1] A small and until recently unimportant background irradiation has always been a part of our environment. To that was added exposure through the diagnostic use of x-rays. We now have the growing problem of radioactive industrial wastes and fallout from nuclear weapons testing. Of these, the hazards from industrial wastes are by far the greatest.

In a comprehensive review of the acute radiation syndrome Gerstner[2] states that all types of penetrating ionizing radiations singly or combined produce one specific clinical picture. This is characterized within two hours after exposure by a sudden onset of anorexia, nausea, malaise, apathy, drowsiness, and fatigue. This progresses rapidly to vomiting and prostration within about eight hours after exposure and then rapidly subsides. By the second postradiation day there may be some residual nausea and vomiting, but by the third day there are usually no symptoms. This is not the true radiation sickness but its prodromal phase. The patient feels quite well during a latent period lasting through the 19th or 20th day, but then there is a sudden onset of chills, fever, malaise, and dyspnea on exertion. The syndrome progresses rapidly for two or three days, when purpura, hemorrhages, and infections, especially of the mouth, occur. Blood examination reveals leukopenia, thrombocytopenia, and anemia. This aplastic anemia progresses, and on about the 30th day there is a crisis. If the patient survives past this time he starts to improve between the 40th and 50th day, and convalescence is usually complete by the 90th postradiation day. Individual variations depend on the size of the dose and individual susceptibility.

Unfortunately, both of these variables are difficult to estimate accurately, but it can be stated that whole-body exposure to 1 to 50 r will usually produce no symptoms. In an emergency situation those whose exposure is believed to be in this range present no medical problem, but if the dose is between 31 and 50 r the mutation rate in offspring is likely to be double the expected rate. If the radiation dose is 51 to 100 r the symptoms will be trivial except in a few highly susceptible persons. If it is between 101 and 150 r the symptoms will be mild and hospitalization will not be required, but if it is between 151 and 200 r about 67% of the victims will develop the acute radiation syndrome. Some of these will require hospitalization, transfusions, and antibiotics, but their prognosis is good. They should all be back at work in three or four months, but complete hematological recovery takes longer. If the dose is between 201 and 400 r hospitalization and intensive treatment will be required. If this is done promptly most but not all will survive. If the dose is between 401 and 500 r the amount of damage to the bone marrow will determine the outcome but the prognosis in general will be poor. If the dose is between 501 and 600 r direct damage to the epithelium of the gastrointestinal tract occurs and survival depends on how effectively this can be combated.

Price[3] calls attention to the pressing need for the development of adequate protective measures before widespread casualties have occurred through neglect. As more and more industries develop sources of nuclear power their efforts to cut costs must be closely watched to assure that this is not done at the expense of increasing hazards. Diagnostic x-ray machines have been improved to the point where the exposure of the patient is cut in some cases to 1/35th of the former level. The guiding principle is that no exposure level that is capable of reduction should be considered a safe level.

If all the aspects of this problem that require prompt action are to get it, it is essential that the public be intelligently alerted to the need for a greatly expanded radiological health program. Such a program must avoid creating fears that would hamper constructive development.

1. Landauer, R. S.: Current Philosophy Regarding Radiation Hazard, A. M. A. Arch. Dermat. **76**: 699-701 (Dec.) 1957.
2. Gerstner, H. B.: Acute Radiation Syndrome in Man, U. S. Armed Forces M. J. **9**: 313-354 (March) 1958.
3. Price, D. E.: Radiation as Public Health Problem, Pub. Health Rep. **73**: 197-202 (March) 1958.

ORGANIZATION SECTION

FORUM ON MEDICAL PRACTICE

Ten experts in the social, legal, and economic aspects of medicine painted an up-to-date picture of these factors for an audience of 800 physicians in Washington, D. C., on March 27. It was the first of a planned series of forums on "The Doctor and His Practice," co-sponsored by The Wm. S. Merrell Company of Cincinnati, pharmaceutical manufacturer, and (at the latest forum) the Medical Council of the Washington Metropolitan Area. Among the speakers were C. Joseph Stetler, Director of the American Medical Association Law Department, and Bernard D. Hirsh, A. M. A. Tax Attorney.

Stetler reported the results of a two-year study of professional liability, which indicated that the vast majority of claims and suits against doctors have not been justly founded. He said: "In some localities the likelihood of being sued is becoming so great that the practicing physician must recognize that it constitutes a definite occupational hazard. . . . Doctors have achieved such good results so often that many patients expect a perfect solution to most medical problems."

Stetler said the survey showed that 14% of all A. M. A. physician members—approximately 18,500 doctors—have had medical professional liability claim or suit brought against them. By states, the highest proportion, 25%, was in California and the lowest 3%, in South Carolina. However, nearly half of these actions were either dropped after filing or decided in favor of the physician. Citing the study results for illustrative purposes, Stetler pictured "the composite defendant physician" as a full-time specialist, in active practice for 13.4 years, who was accused by a 34.4-year-old housewife patient because of surgery performed in a hospital—and who "quite possibly" can attribute precipitation of the claim to a derogatory comment of some other physician.

Hirsh, in his presentation, suggested that large medical clinics having numerous partners "re-examine their organizations, operations, and tax practices in the light of the possibility that they may be considered associations taxable as corporations." He pointed out that the A. M. A. House of Delegates last December adopted a resolution which not only recognizes the propriety of group medical practice through unincorporated associations, but corporate practice as well where it is permitted by law (as in Connecticut and Oklahoma) and exists under the exclusive ownership and management of physicians.

Ernest Dichter, director of the Institute for Motivational Research, told the medical audience: "The doctor who treats his patients as if they were intelligent, aware people with a perfect right to understand the diagnosis and the treatment prescribed, will find his patients responding with acceptance and loyalty."

Speaking on medical office management, George W. Condit, a consultant in that field, said: "The average doctor looks at the matter of placing a financial evaluation on his services as the illegitimate offspring that he has created in his marriage to the profession. While these illegitimates cannot be ignored completely, their needs can be overlooked—except for those times when the check book begins to wheeze a little plaintively."

The luncheon speaker—on the topic of stress in the world, the individual, and the doctor—was Dr. Howard A. Rusk, director of the department of physical medicine and rehabilitation at the New York University–Bellevue Medical Center. Other forum presentations were by Wisconsin attorney Robert B. Murphy on tax program planning, Cleveland attorney R. Crawford Morris on professional liability, investment consultant Carl Holzheimer; insurance company executive James A. Eubanks; and estate planning consultant Amiel Caplan.

NEW EXHIBITS FOR THE PUBLIC

The A. M. A. Bureau of Exhibits announces that a number of new exhibits will be ready for showings by local medical societies at fairs, home shows, schools, and similar public gatherings this spring and summer.

You Can Reduce.—This exhibit shows foods to fill up on and those to stay away from; it gives the visitor an opportunity to check his weight on the scales, presents answers to pertinent questions on reducing, and pictures 25 different foods and the number of calories in the servings shown.

Food and Nutrition Quackery.—Developed in cooperation with the U. S. Food and Drug Administration, the Post Office Department's fraud division,

and the National Better Business Bureau to point up the false claims made in the promotion of food products and nutrition ideas, this exhibit exposes house-to-house peddlers of "food supplements," nutrition and health lecturers and so-called experts; displays various reducing aids on a roulette wheel; and features a "buyer beware" section explaining how the public can recognize food quacks and their claims.

Breathing.—This exhibit presents the anatomy of the respiratory system. The viewer can see how lungs expand and contract and how the ribs move.

Glands.—The location and functions of various glands in the body are shown in this exhibit, which presents three-dimensional models of glands.

Poisoning of Children.—Dangers of common household products are demonstrated in this exhibit, which depicts those products that are leading causes of poisonings in children at home.

Health Appraisal of the School Child.—Highlights of principal health appraisal procedures, such as teacher observation, dental and medical examinations, and the follow-through are shown in this exhibit.

LIECHTENSTEIN APPROVES EMBLEM

The Liechtenstein Medical Association has become the first of 53 members of the World Medical Association to obtain official government recognition of the WMA emblem for identifying and safeguarding civilian medical care units in time of national emergency. The international civil defense emblem was adopted at the 10th WMA assembly recently after it was learned that the Red Cross and the Geneva Convention of 1949 protect health teams during disaster situations only if these teams are part of the national military organization. The red emblem (see figure) has been approved by many member associations and transmitted to their governments (including the United States) for legislative authorization. The 15 doctors from Liechtenstein serve a population of 13,571 in an area of 62 square miles.

COUNCIL ON MEDICAL SERVICE

PLACEMENT OF PHYSICIANS IN NORTH CAROLINA

The Medical Society of the State of North Carolina is interested in the areas of the state that need more medical care, with particular emphasis on (1) the small communities having no resident physician and (2) the communities with an overworked physician or physicians. This statement is borne out by the physicians' placement service activity.

Background

A recent 10-year progress report on health and medical care improvements in North Carolina indicates that in 1946 there were 2,104 physicians in North Carolina, giving a physician-population ratio of 1:1,733. In 1956 the state had 3,317 physicians with a physician-population ratio of 1:1,317. Fifty per cent of the 100 counties in North Carolina have at least one physician for every 2,000 people, while 9% of this group have a population of 1,000 or less per physician. Twelve per cent of the counties have a population of 5,000 or more per physician.

The formal, well-established placement service under the personal supervision of Mr. James T. Barnes, Executive Secretary of the Medical Society of the State of North Carolina, has done much to improve medical care in the rural and semirural areas of the state. Mr. Barnes, who is a native of North Carolina, knows personally the medical service available, as well as that needed, in every corner of the state. This firsthand information has been of value both to the physician and to the community seeking a physician. For the past several years Mr. Barnes has had the assistance of Mrs. Annette S. Boutwell, Health Education Consultant, for the medical society. Mrs. Boutwell's extensive field work has been helpful to the communities seeking a physician and to the physicians seeking a location for practice.

Community Requests for General Practitioners

When a community leader or committee contacts the state office, either by letter or by personal visit, requesting assistance in securing a physician, a

questionnaire "Information from Community Concerning Location for General Practitioner" is offered for completion. This gives a file copy of the story of the medical assets and needs of the community as well as the factors that would make the place attractive to the physician's family.

The form is based on the one prepared by the Committee on Medical and Related Facilities of the A. M. A.'s Council on Medical Service. One item on the form that is often answered sketchily is: "Describe any additional community assets which might attract a physician." Field work on the part of the state society staff offers valuable supplementary information, particularly with respect to this item. For this reason, too, verification of the medical need of the community is not required from the county medical society. However, it is strongly recommended by the staff members that any physician visiting a potential practice location make it a point to call on the nearest physicians and hospitals.

Some of the communities build medical facilities and even homes before requesting the assistance of the state medical society in securing a physician. If consulted first, the society advocates securing a physician before undertaking any construction, although it is considered wise to have the money available for any projected building program.

Communities that are in the beginning stages of seeking a physician are encouraged to form a committee from among the community leaders. The committee often visits the state office as a first step. With guidance from that source the committee takes an inventory from the viewpoint of the medical needs of the community and from that of the physician, who would also be considering the location with regard to the desirability for his family. Some points which the community would want to consider are (1) doctor-population ratio, (2) distance to nearest adequate medical care, (3) age of physicians serving the area, (4) need as seen by those living in the community, and (5) the interest of the community in improving the situation.

From the standpoint of the physician, the community needs to consider the (1) hospital facilities, (2) office facilities offered by the community, (3) opportunity for assured income, such as industrial accounts, health officer, or other sources, (4) facilities for family life, as housing, schools, churches, and social opportunities, (5) availability of postgraduate education, (6) possibility of coverage during vacation, and (7) proximity to a large medical center.

The Community Development Program in North Carolina has been responsible during recent years for much of the activity toward improvement in (1) incomes, (2) homes, (3) youth programs, (4) agriculture, and (5) community life in general. Half a dozen such area programs now functioning in the state encompass a total of 41 counties with an additional 16 counties being organized into another area program. The encouragement offered by these programs has helped in channeling many one crop areas into diversified farming with emphasis on the small farm operated by a resident landowner rather than the single-crop plantation which is too often under absentee ownership. Improvements and signs of growth that are evident in the four topographical sections—the Mountain, the Piedmont, the Coastal Plain, and the Tidewater—are making the communities more attractive both to lifetime residents and to industries seeking a new location.

Under the aegis of the governor's current program for expansion of small industry, many plant installations and developments can be cited. An example is Swift and Company's five-million-dollar animal products processing plant encompassing all of the Coastal Plain and Tidewater sections of the state. This plant is not only encouraging industrial employment but is also building a diversified agricultural program which will raise the income level of rural people in these sections of the state. Similar projects characterize the movement in other regional divisions of the state. This trend bespeaks the ever increasing need for medical and health services throughout the state and points up opportunities to physicians seeking location for practice. Confirming this trend, in one county of the state, 85 new industries were established during the year 1957.

Processing the requests of communities seeking a physician usually falls into the following three steps: 1. A list of physicians, with a current address, is made available to community leaders. This list, which contains the names of physicians who have requested location information for the state of North Carolina, includes physicians currently completing an internship or residency, physicians who wish to relocate, and physicians who are being released from military service. Biographical data is not supplied with this list. Community leaders may contact these physicians and make known the medical needs of the town. It is also the responsibility of the leaders to check the references just as the physician is responsible for securing community data. 2. The name of the town, with the name of the responsible person or persons to be contacted for further information, is added to the state list of communities seeking a physician. 3. Once a town is placed on the state list it is not removed until medical care is secured. The first town to request the assistance of the present executive secretary when he joined the staff 10 years ago was listed until two years ago, when a young man from the

county completed his medical training and set up practice in the town. In order to better serve inquiring physicians who express an interest in practicing in North Carolina, every effort is made to keep the files on real medical needs of communities up to date at all times. To ascertain whether the position listed with the state office has been filled or not, a follow-up form is sent at intervals of six months to the community contact person.

Then there are the communities that secure a doctor and lose him—by death, to the services, or to a specialized field. The state society has a helping hand to offer each time requested. Recently a town was aided in securing the third physician in two years. Other communities can offer similar accounts. At the present time the list of communities seeking a general practitioner in North Carolina totals 143. This list includes both opportunities for solo practice and for association.

Requests received from communities outside North Carolina for assistance in securing a physician are not listed. The state medical society is familiar wih the medical needs of North Carolina, but it does not feel justified in evaluating a community request from another state. Such a request could be from a town where additional medical care is not needed. Out-of-state inquiries are referred to the Physicians Placement Service of the A. M. A.'s Council on Medical Service, which serves as a clearing house for requests from the community and physician.

Success Stories

A sample of the community-physician success stories found in the files of the Medical Society of the State of North Carolina is given in the thumbnail descriptions listed below:

Windsor's Crossroads:—Under the leadership of the 30-member grange, Windsor's Crossroads, an unincorporated community of 125 families, raised the funds to build a six-room medical facility. With the cooperation of the press and of physicians in the neighboring towns of Yadkinville and Statesville, the physician committee succeeded in getting a Kansas-born physician to establish his practice in this community in the foothills of the Blue Ridge Mountains. The physician was offered, and he accepted, the opportunity to purchase the building after his practice was established. For their effort, the people of Windsor's Crossroads secured not only a physician but also the $1,000 award for first place in the North Carolina State Grange Community Service Contest and the fourth place award in the national grange contest.

Magnolia:—Postal cards received by the Medical Society of the State of North Carolina over a period of 10 years from a woman who sought a physician for her town stopped about two years ago. The Lions Club had caught the enthusiasm for securing a resident physician for Magnolia. When a young physician returned to his home county for Easter vacation, members of the executive committee of the Lions Club persuaded him to leave Baltimore and return to Magnolia to practice. He is now buying the medical facility built by the people of this community of 585.

Rock Ridge:—Rock Ridge, an unincorporated community with a school as up to date as any city system and with attractive, well-kept homes that would hold their own in "Anywhere," U. S. A., has recently secured a physician for its clinic. Standing side by side in front of a grove of tall pine trees are two clinic buildings. One is a two-room facility in which Thomas G. Bradshaw, M.D., practiced for 30 years, until his death a few years ago. The other, a neat eight-room cement block building with inlaid floors and Venetian blinds, is now fully equipped and occupied by a physician who recently completed his training. This facility could accommodate two physicians.

Saxapahaw:—Saxapahaw, a community of 600, built a physician's home and had construction on a clinic well under way before the physician committee visited the office of the state medical society to request aid in securing a physician. Plans were to make these structures available to a physician on a rental basis. Typical of the spirit of the community is the fact that securing and losing a doctor three times did not prevent them from finding a fourth physician. The first physician went into a specialty in another state; the second, who was a bachelor, decided that a physician with a family would fit better into a rural community. The third physician died early in his career. With their fourth physician, Saxapahaw is again enjoying local medical service.

Sealevel:—Sealevel, an isthmus seacoast community of 466 is connected with the North Carolina mainland by extended dry-weather-road and boat service. A 24-bed hospital-clinic built by two brothers who grew up in the community is now administered by a local board. A $10,000 guarantee was offered to attract a physician, with special training in surgery, to move to the doctorless island. The surgically trained, general physician who accepted the offer made well above the amount which had been guaranteed, obviating any payment. Within 18 months he was joined by a full-time surgeon. Now, with a recently completed 20-bed addition to the hospital, consideration is being given to adding an internist to the group.

It took a special trip to the state society office to see these and the many other similar accounts portraying the good results brought about by the co-

operation between the communities of the state and organized medicine. The staff is of the opinion that their time is better spent in assisting physicians and those seeking their services in getting together than in talking about what has already been accomplished.

Requests for Specialists

Although the greatest immediate demand is for more physicians practicing general medicine, assistance is also available to those seeking a specialist. When a request is received by the state office from (1) a specialist seeking an associate, (2) a group practice planning to add to the staff, or (3) community leaders who feel that the area can utilize and support the services of specialists, a questionnaire is presented requesting pertinent information that would be of value to an inquiring physician. In many cases the secretary of the county medical society will notify the state medical society of likely opportunities for specialists. The state placement service compiles a list of the towns where the need for a specialist has been indicated, with the address of a person to contact for further information. Lists are prepared for opportunities in otorhinolaryngology, internal medicine, obstetrics and gynecology, orthopedics, pediatrics, surgery, and urology. At intervals of about six months, follow-ups are made to determine whether specialty openings have been filled.

Referral may also be made to a number of the national specialty organizations which maintain placement services. A copy of the information is also made available to the A. M. A. for the use of physicians who visit that office.

Physician Inquiries

North Carolina is fortunate in having three medical schools: (1) the University of North Carolina School of Medicine at Chapel Hill, (2) the Bowman Gray School of Medicine of Wake Forest College at Winston-Salem, and (3) Duke University School of Medicine at Durham. In 1957 the graduates from these schools totaled 192. While they are still in medical school these future physicians direct many inquiries to the placement service of the Medical Society of the State of North Carolina. The inquirers realize that the list of opportunities changes frequently, but some idea is gained of the supply and demand.

Other sources of physician placement inquiries are from the physicians who (1) are being released from service, particularly those from nearby Fort Bragg, Camp LeJeune, and the Norfolk Navy Base, (2) are completing their medical training as interns or residents, and (3) wish to relocate. Physicians who make inquiry from the A. M. A. Physicians Placement Service relative to opportunities in North Carolina are also referred to the state office for assistance.

When a physician makes inquiry from the state office about opportunities for practice, a questionnaire, "Information from Physician Seeking a Location," is offered for completion. This form provides, in addition to the physician's personal data, his medical training, military status, and the type of practice in which he is interested. Immediate processing of the returned questionnaire includes (1) adding the physician's name and address to the state list of available physicians, which is sent to the communities seeking a physician, and (2) sending the physician a personal letter with (*a*) a list of communities seeking a physician, (*b*) a highway map of North Carolina, and (*c*) a copy of the current annual issue of the "North Carolina Travelbook," edited by Ken Knight. In the letter it is suggested that the physician check the list of communities with the map and the travelbook, then write the state society for further information on the specific communities in which he is interested. Mr. Barnes incorporates into the letter the facts received directly from people in the community as well as his own firsthand information about the area. After securing as much information as possible by correspondence, the physician seeking a location is encouraged to visit the communities that appear most interesting to him and to his family.

More than 10% of the physicians now practicing in North Carolina were assisted by the Medical Society of the State of North Carolina in finding a location. The function of placement has contributed in some measure to the growth of the society membership, which in a decade has increased by 52%.

Medical Survey

To further assist the physician seeking a location, a medical practice survey was made of the members of the state society in 1957. In the survey 34 fields of medicine were taken into consideration, including (1) general practice, (2) the specialties, (3) industrial medicine, and (4) public health. A breakdown of the 34 fields of medicine indicates 1,098 physicians active in general practice, 1,781 in specialties, 11 in industrial medicine, 70 in public health, and 27 in other branches.

As previously stated, a mimeographed list of communities seeking a general practitioner is available to the inquiring physician, with detailed information available through a letter, on request. These communities are areas that have requested assistance in securing more medical care. There are other areas that have not requested aid that could very well support additional general practitioners. If a physician is interested in a particular

town in North Carolina but does not find it on the list for physicians needed, the state society will supply information to help him evaluate the location as to medical need. This information lists the number of (1) general practitioners, (2) internists, and (3) surgeons, by age group in each county, as well as the county population. While these are not the only factors to be considered, they are important ones.

TABLE 1.—*Number of General Practitioners, Internists, and Surgeons, According to Age Group*

Age Group	General Practitioners	Internists	Surgeons	Total
Under 30	131	7		138
30-40	399	179	135	653
40-50	247	104	124	475
50-60	157	45	63	265
60 or over	212	35	55	302

It is interesting to note from the summary of the information found in table 1 that the largest number of general practitioners, internists, and surgeons occurs in the 30-to-40-year age range. This range accounts for 36% of the total number of practicing physicians in the three physician-groups: general practice, surgery, and internal medicine. Of the total number of practicing physicians in the three groups mentioned above, 69% are 50 years of age or less. The largest number of internists are under 40. More general practitioners, as well as more surgeons, are under 50. Although, according to figures from the 1956 edition of the A. M. A. Medical Directory, North Carolina is in the lowest

TABLE 2.—*Number of Physicians, According to Type of Practice in the Eight Counties of North Carolina with a Population over 100,000*

County	Population	General Practitioners	Internists	Surgeons	Other	Total
Buncombe	135,749	28	26	24	94	172
Cumberland	122,608	9	11	7	24	51
Durham	117,147	12	38	21	101	172
Forsyth	160,388	32	40	23	104	199
Gaston	127,728	37	5	8	17	67
Guilford	217,984	44	39	32	96	211
Mecklenburg	229,850	37	48	35	146	266
Wake	155,592	32	24	15	72	143
Total	1,267,046	231	231	165	654	1,281

quarter of the states when considering the physician-population ratio, there are several factors that offer encouragement in the belief that this picture will continue to improve, namely, (1) interest of the doctors within the state in bringing in additional physicians, as evidenced by the potential opportunities listed by the secretaries of the county medical societies; (2) the steady drive on the part of the staff of the state medical society to improve this situation; and (3) the high percentage of physicians found in the younger half of the age classification.

As indicated in table 2, the eight counties of North Carolina with an individual population of 100,000 or more account for approximately 30% of the state's population. In these same counties are to be found about 39% of the state's 3,317 physicians. The percentage difference would be even smaller if the number of physicians in public health, medical education, hospital administration, industrial medicine, and other related fields, were not included in this count.

Consideration of these figures might leave the impression that though the physician-population ratio is not up to the national average, the physicians available are well-distributed. This is true for the counties with the largest population. Checking on the counties with a population under 100,000 shows such an exception as Orange County with a population of 42,671 and 78 physicians.

However, 11 of the 100 counties in the state have a physician-population ratio of 5,000 or more. Table 3 lists these counties with their population and the number of practicing physicians.

TABLE 3.—*Number of Practicing Physicians per County in North Carolina in Counties with Physician-Population Ratio of 1:5,000*

County	Population	Practicing Physicians
Brunswick	20,768	3
Camden	5,065	1
Caswell	21,479	3
Clay	5,716	1
Davie	15,790	3
Gates	9,199	2
Greene	17,654	2
Hyde	5,479	1
Jones	11,062	1
Onslow	59,527	12
Pender	18,938	4

Although the need and the opportunity are foremost for the general practitioner, he is not the only one who can secure specific information about areas where his services are needed—whether a community request has been listed or not. Figures available for the specialists include (1) a state total of physicians who have indicated that their practice is limited to a given specialty, and (2) a breakdown of this figure by county, if the inquiring physician indicates in his letter the specific counties in which he is interested. For example, an inquiring ophthalmologist will be informed that there are 44 specialists in his field, or 1 per 100,000. There are 127 physicians, or 1 per 35,000, who limit their practice to the related field of otolaryngology.

Figures used in this material came from the survey cards prepared by the Medical Society of the state of North Carolina and from the "Ten Year Progress Report on Health and Medical Care Improvements in North Carolina." The State Society used membership as a basis for physician-population ratio.

MEDICINE AND THE LAW

REVIEW OF MEDICAL PROFESSIONAL LIABILITY CLAIMS AND SUITS

This article is an illustrated summary and compilation of information dealing with medical professional liability obtained from (1) an opinion survey of members of the American Medical Association; (2) a review of the history of reported medical professional liability suits; (3) a survey of medical professional liability experience in California; and (4) a survey of medical professional liability experience in Alameda–Contra Costa counties, California.—ED.

Approximately 18,500 living physicians in the United States who are members of the American Medical Association, or about one out of every seven, have had a medical professional liability claim or suit brought against them at some time in their careers. Of those who have had a claim or suit brought against them, 13% have had more than one.

Multiple Claims and Suits

In California, 1 out of every 4 physicians have had a claim or suit, while in South Carolina the figure is less than 1 out of every 33. The incidence of such claims and suits in all other states falls between these ratios.

The median number of years in practice of physicians who have had a claim or suit brought against them is 13.4 years. Thus, there are as many physicians involved who have been practicing more than 13.4 years as there are with fewer years of practice.[1] These figures are not too startling when we realize that they represent all of the claims and suits brought against living physicians whose periods of practice range from 1 year to as long as 50 years. Furthermore, 40% of all of the claims and suits have either been dropped or decided in favor of the physician.

Professional Liability Trends

The first reported [2] medical professional liability case in the United States was decided in Connecticut in 1794. From that time until 1900 there were only 224 reported cases in the entire country. From 1900 through 1955 1,712 cases were reported.[3]

Up until 1900 on the basis of the total number of reported cases the state of New York led the country, followed in order by Indiana, Illinois, Pennsylvania, Ohio, and Maine. The study of incidence by states based on the total number of reported cases through 1955 showed the first to be California, the second New York, the third Ohio, the fourth Missouri, the fifth Washington and the sixth Illinois and Minnesota. Delaware is the only state that has had no reported medical professional liability suit through 1955. The greatest number of reported medical professional liability cases for any five-year period has been from 1930 through 1935, when there were 244.

Results of Professional Liability Surveys

Recently, the results of three studies on medical professional liability have been published: one on a national level, by the American Medical Association;[4] a second on a state level, by the California Medical Association;[5] and a third on a county level by the Alameda–Contra Costa counties Medical Association.[6] The similarity of the results of these studies is most striking.

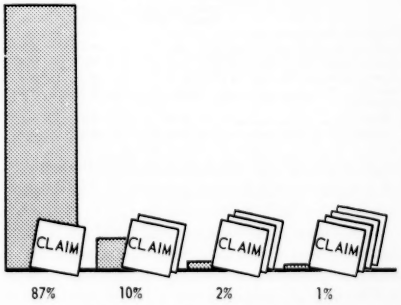

Fig. 1.—Multiple claims and suits.

On the basis of the national study, we find that specialists, who make up about 44% of the physician population, are the defendants in medical professional liability claims or suits about 50% of the time. In the state of California the specialist comprises 58% of the physician population and is the defendant 57% of the time. In Alameda–Contra Costa counties 55% of the physician population are specialists, and they account for 46% of the claims and suits.

Sixty-three per cent of the medical professional liability claims and suits across the country stem from a surgical act; in California, 63% of the claims and suits arise from surgical acts, and in Alameda–Contra Costa counties 68% of the cases are surgical.

The alleged negligent act is performed in the hospital in 67% of the cases over the country. In California 71% of the alleged negligent acts are performed in the hospital, and in Alameda–Contra Costa counties some 70% of the alleged negligent acts are performed in the hospital.

Medical Society Prevention and Review Programs

Twenty-one state medical societies have initiated claims prevention programs and 31 states have claims review programs on a state or county level. Activities in connection with claims prevention programs include lectures, panel discussions, and the distribution of literature on the subject of medical professional liability. The prevention programs, in general, consist of a mechanism whereby the defendant physicians' colleagues evaluate the validity of a claim or suit for the purpose of advising the defendant or his insurance carrier.

Comparison of Survey Data: Professional Liability

	County (Alameda–Contra Costa)	State (California)	National
Hospital cases, %	70.0	71.0	67.0
Surgical cases, %	68.0	62.9	63.1
Medical cases, %	18.4	16.8	20.0
General Practice, %	54.4	43.4	47.0
Specialist, %	45.6	56.6	50.4
Claimant			
Male, %	39.0	41.0	44.0
Female, %	61.0	59.0	56.0

In California the medical and legal professions have recently formulated a program whereby a panel of physicians are made available for consultation and as witnesses in medical professional liability cases. The physicians are appointed to this panel by the local medical society with the approval of the local bar associations.

Insurance Facts and Figures

Ninety-three per cent of the physicians in the country carry medical professional liability insurance which is underwritten by a least 45 carriers. Not all of the companies do business in every state, and 21 are active in only one or two states. Thirteen state medical societies have either a group insurance program or have endorsed a particular policy. In addition, the physicians in at least one state have recently formed their own stock insurance company which offers professional liability insurance to the physicians of that state. Nine out of 10 physicians in the country have no difficulty in obtaining medical professional liability insurance.

Difficulty in Obtaining Insurance

Generally, even physicians who have experienced a claim or suit do not have difficulty in obtaining insurance coverage. Furthermore, most physicians believe that their insurance rates are reasonable.

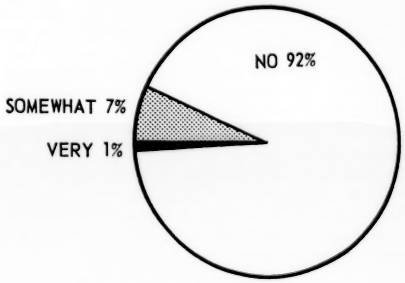

Fig. 2.—Difficulty in obtaining insurance.

In 1956 the median amount of medical professional liability insurance carried by general practitioners was $25,000/$75,000 and by surgeons $100,000/$300,000.

Primary and Secondary Causes of Claims and Suits

Medical professional liability claims and suits are initiated for a variety of reasons. The primary reason in 24% of the claims and suits is poor operative results; in 20%, poor medical results; in 10%, errors in diagnosis; and in 9%, foreign bodies left in the patient. The remaining reasons accounted for no more than 8% each.

Twenty-seven per cent of the secondary causes are under the direct control of the medical profession and include careless comment about another physician and situations in which the patient had another disease or disability which was not properly diagnosed or which progressed badly. Twenty-two per cent of the secondary causes consisted of pressures or influences exerted on the claimant by such

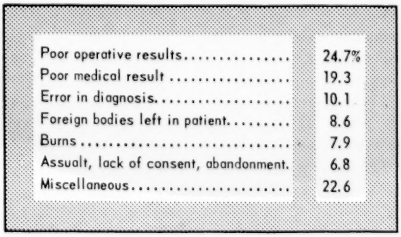
Poor operative results 24.7%
Poor medical result 19.3
Error in diagnosis 10.1
Foreign bodies left in patient 8.6
Burns 7.9
Assault, lack of consent, abandonment 6.8
Miscellaneous 22.6

Fig. 3.—Primary reasons for claims.

outsiders as attorneys or relatives. The patient himself is a producing factor in 25% of the secondary causes. The factors included in this category are the bringing of claims for financial profit, the avoidance of paying a medical bill, confusion because of a mental disability, or the fact that the patient was an alcoholic or a narcotic addict.

Status of Claims and Suits

The following figures indicate the percentages of medical professional liability claims and suits that are pending, dropped, compromised, or settled as well as the percentage of suits decided for or against the claimant. It will be noted that 33% of the claims and 29% (20 plus 9%) of the suits result in the claimant obtaining some money from the defendant physician, and 17% of the claims and 53% (12 plus 41%) of the suits terminate without the claimant obtaining any money from the defendant.

Summary

From all of the facts and statistics available, it is possible to picture the composite national claimant as 34.4 years old, a housewife who is most probably dissatisfied with an allegedly poor operative result. The national composite defendant physician appears to be a full-time specialist in active private practice. He has probably been in practice for 13.4 years and carried medical professional liability insurance at the time of the alleged negligent act. The incident complained of most probably occurred in a hospital. It involved surgery and was quite possibly precipitated into a claim because of a

Careless comment by another physician..	25.2%
Action prompted by attorney.....	15.4
Claim brought for financial profit.....	13.8
Patient had mental disability.....	7.9
Action prompted by relatives.....	7.2
Patient was alcohol or narcotic addict...	2.9
Patient had another disease or disability which progressed badly.....	2.1
Miscellaneous, not possible to classify..	25.5

Fig. 4.—Secondary reasons for claims.

comment by some other physician. The claim probably went on to suit but, if so, the patient probably did not receive an award or settlement. After the claim or suit was disposed of, the physician did not experience difficulty in obtaining or renewing his medical professional liability insurance.

Analyzed in retrospect, nearly all medical professional liability claims and suits are theoretically preventable. For many years, however, the profession has been stymied in its efforts to combat this serious problem because no comprehensive study had been made of the problem. Now, the results of three studies are available. Armed with

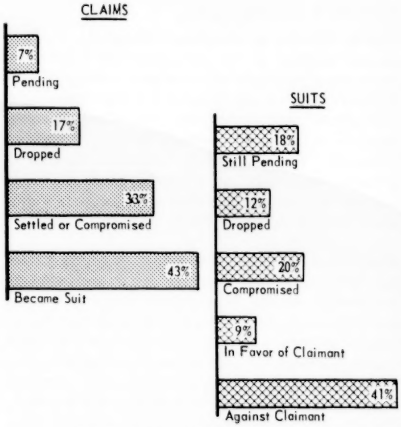

Fig. 5.—Disposition of claims and suits.

this information, the profession should be able to move forward with greater confidence and with better success in its battle with this problem. Active and effective prevention programs must be initiated and implemented at the local, state, and national level. These programs should encourage the adoption of methods of conducting a medical practice which will minimize professional errors and reduce the likelihood of having claims filed in the event of an untoward or poor result.

References

1. Analysis of Professional Liability Claims and Suits, Medicine and the Law, J. A. M. A. **165**:608-612 (Oct. 5) 1957.

2. *Cross* v. *Guthery*, 2 Root 90 (Conn., 1794).

3. Sandor, A. A.: History of Professional Liability Suits in United States, Medicine and the Law, J. A. M. A. **163**:459-466 (Feb. 9) 1957.

4. Reference 1. Opinion Survey on Medical Professional Liability, Medicine and the Law, J. A. M. A. **164**:1687-1690 (Aug. 10) 1957.

5. Sadusk, J. F., Jr., and Waterson, R.: Professional Liability: Statistical Study of Professional Liability Claims in California: 1957 Report of Medical Review and Advisory Board, California Med. **87**:192-199 (Sept.) 1957.

6. Sadusk, J. F., Jr.: Analysis of Professional Liability Program in Alameda–Contra Costa Counties: 1946-1954, Alameda–Contra Costa County M. A. Bull., May, 1955.

MEDICAL NEWS

DISTRICT OF COLUMBIA

Alumni Meeting at Freedmen's Hospital.—The 36th annual meeting of the Association of Former Internes and Residents of Freedmen's Hospital will be held at the hospital June 3-5. A golf tournament will precede the convention. The scientific meetings will be held in the Biology Building of Howard University. For information write Dr. George L. Johnson, Chairman of Publicity, Association of Former Internes and Residents of Freedmen's Hospital, 1336 W Street, N.W., Washington 9, D. C.

Personal.—Dr. John F. Nancarrow, of Chevy Chase, has been appointed head of the department of hematology at the Washington Hospital Center. Dr. Nancarrow was formerly head of the hematology department at the National Naval Medical Center, Bethesda.——Dr. William B. Walsh on Jan. 15 was among five persons named to the National Advisory Committee on the Selection of Physicians, Dentists, and Allied Specialists, an advisory committee to Selective Service which will coordinate the needs of the armed forces for physicians and dentists with civilian needs. The following day his appointment to the Health Resources Advisory Committee of the Office of Defense Mobilization was announced. This committee will advise the director of ODM on matters in the health field as they relate to mobilization programs.——Dr. Murray M. Copeland, professor of oncology at Georgetown University, has been appointed to the National Advisory Cancer Council, for a term of office ending Sept. 30, 1961. As a member of the council, Dr. Copeland will advise and make recommendations to the Surgeon General regarding research activities of the National Cancer Institute.

FLORIDA

Annual State Medical Convention.—The 84th annual convention of the Florida State Medical Association will be held May 11-14 at the Americana Hotel, Bal Harbor. Dr. Nelson Zivitz, president, Dade County Medical Association, will open the general sessions with an address May 12, after which the following presentations by out-of-state speakers will be given:

Is the Game Worth the Candle, Dr. David B. Allman, President, American Medical Association, Atlantic City, N. J.

The Greatest Problem of Medical Education and Its Relation to Medical Practice, Dr. Orren W. Hyman, dean, University of Tennessee College of Medicine, Memphis.

Organ Transplantation—Past, Present and Future, Dr. David M. Hume, chairman, department of surgery, Medical College of Virginia, Richmond.

Role of the General Physician in the Changing Picture of Tuberculosis, Dr. David T. Smith, chairman, department of bacteriology, Duke University School of Medicine, Durham, N. C.

Two panel discussions are planned: "Recent Advances in Modern Methods of Diagnosis and Therapy" and "Medical and Surgical Aspects of Chest Diseases," moderated by Drs. Hume and Smith, respectively. The annual dinner is scheduled for May 13, 7:30 p. m. Exhibits, a golf tournament, a ladies' program, and a president's reception are arranged, and facilities for fishing will be available. For information write Dr. Samuel M. Day Jr., Secretary, Florida Medical Association, P. O. Box 2411, Jacksonville 1, Fla.

University News.—The department of medicine of the University of Miami School of Medicine has received a grant of $75,000 from the Squibb division of Olin–Mathieson, for clinical cancer chemotherapy studies over a three-year period. A special unit is being set up in Jackson Memorial Hospital to handle the transition from laboratory to clinical testing.

ILLINOIS

Annual State Medical Meeting in Chicago.—The 118th annual meeting of the Illinois State Medical Society will be held May 20-23 at the Hotel Sherman, Chicago. The president's address by Dr. Lester S. Reavley, Sterling, on May 21, will be followed by the Annual Address in Medicine, "The Place of Oral Hypoglycemic Agents in the Management of Diabetes," given by Dr. Alexander Marble, Boston, and the Annual Address in Surgery, "Hypertension—Drugs and Surgery," by Dr. Keith S. Grimson, Durham, N. C. The following out-of-state participants in the general sessions are listed: Drs. Morton D. Leigh, Los Angeles; Everett L. Pirkey, Louisville, Ky.; Nelson W. Barker, Rochester, Minn.; Francis Fralick, Ann Arbor, Mich.; Harry Bakwin and Anthony C. Cipollaro, New York City; Jerome Glaser, Rochester, N. Y.; Clyde L. Randall, Buffalo; Oscar B. Hunter Jr. and Capt. Norman Lee Barr, M.C., U. S. N., Washington,

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

D. C.; James D. Weaver, Erie, Pa.; and William B. Parsons Jr., Madison, Wis. A public relations dinner May 20 will feature Dr. F. J. L. Blasingame, General Manager, A. M. A., speaking on "It's Your AMA." Symposiums, panel discussions, special luncheons, exhibits, and a ladies' program are planned. The annual dinner will be held May 21, 7 p. m.

Chicago

Medical History Lecture.—Dr. Esmond R. Long, emeritus professor of pathology, Henry Phipps Institute, University of Pennsylvania, Philadelphia, will present the final in a second series of 10 lectures on the history of surgery and related sciences at the International College of Surgeons Hall of Fame, Chicago, May 13. Dr. Long's subject will be "Historical Facts About Morgagni, Rokitanski and Virchow, Pathologists."

Appoint Otolaryngology Department Chairman.—Dr. J. Allan Weiss, associate professor of otolaryngology at Chicago Medical School, has been appointed professor and chairman of the department of otolaryngology. He succeeds Dr. Maurice H. Cottle, who will remain with the school as professor of otolaryngology. Dr. Cottle resigned the department chairmanship in order to devote more time to research. Dr. Weiss, a native of Chicago, is attending otolaryngologist at Michael Reese and Cook County Hospitals.

University News.—H. J. Rogers, Ph.D., of the bacterial physiology division, National Institute for Medical Research (Medical Research Council), London, England, arrived in the United States in mid-March to work for three months in the laboratory of Dr. Albert Dorfman, department of pediatrics, University of Chicago.—Dr. Ian H. Wood, assistant director, The Walter and Eliza Hall Institute of Medical Research, Royal Melbourne Hospital, Melbourne, Australia, presented "The Etiology of Liver Disease in Australia" at the University of Chicago department of medicine April 10.

KENTUCKY

Annual Senior Day.—The fourth annual Senior Day program, sponsored by the Kentucky State Medical Association with the cooperation of the Jefferson County Medical Society and the University of Louisville School of Medicine was held in Louisville April 21. The program featured Dr. Louis M. Orr, vice-speaker of the A. M. A. House of Delegates, as dinner speaker. Dr. Edward B. Mersch, Covington, president, Kentucky State Medical Association, spoke at the noon session. Dr. Richard G. Elliott, II, Lexington, was chairman of the program.

MASSACHUSETTS

Dr. Warren Honored.—Friends of Dr. Sheilds Warren honored him at a dinner in Boston Feb. 26 on the occasion of his 60th birthday. They have established the Shields Warren Fund of Boston University, the income of which is to be used to elevate standards of scholarship and teaching, by the creation of "distinguished professorships" bearing his name.

NEW MEXICO

Annual State Medical Meeting in Albuquerque.—The 76th annual meeting of the New Mexico Medical Society will be held in the Civic Auditorium, Albuquerque, May 14-16. A clinical-pathological conference, May 14, will be moderated by Dr. Charles R. Beeson. Three panel discussions are scheduled:

Diagnosis and Management of Anemia, moderated by Dr. Matthew H. Block, Denver.

Management of the Acutely Traumatized Patient, Dr. Rupert B. Raney, Los Angeles.

Management of the Geriatric Patient, Dr. Thomas P. Findley Jr., Augusta, Ga.

The program lists the following guest speakers: Drs. Elmer Belt, Los Angeles; Alston Callahan, Birmingham; Alan L. Frankel, Albuquerque; Max S. Sadove, Chicago; and Kinsey M. Simonton, Rochester, Minn., as well as Drs. Block, Findley, and Raney. Dr. Gunnar Gundersen, President-Elect, American Medical Association, will present "Changing Concepts in Medical Education" at a luncheon May 15. Specialty luncheons and movie sessions are arranged. Registration fee is $10. For information write Dr. Stuart W. Adler, New Mexico Medical Society, 221 Central, N. W., Albuquerque, N. M.

NEW YORK

Annual Health Conference.—Health officials representing the Soviet Union, India, and Africa will speak at one of the two general sessions at the 54th annual Health Conference of the New York State Department of Health in Rochester. The four-day conference will start June 9. The speakers will participate in a symposium on "International Health" at 10 a. m., June 11, at the Rochester War Memorial Auditorium. Participating will be Sir Arcot Mudaliar, M.D., vice-chancellor of the University of Madras in Madras, India; Dr. F. Cambournac, World Health Organization Regional Director for Africa; and Dr. Victor Zhdanov, vice-minister of health for Russia. Moderator will be Dr. Henry Van Zile Hyde, chief, Division of International Health, U. S. Public Health Service. The first general session of this year's conference will be devoted to "Expanding Scope and Concepts of Environmental Health." Among the speakers will be Roy J. Morton, president, American Public Health Association, and Dr. Thurman B. Givan, president, Medical Society of the State of New York

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New York City

Residency in Pediatric Oncology.—Applications for the residency from Jan. 1, 1959, to Dec. 31, 1959, in pediatric oncology at Memorial Center for Cancer and Allied Diseases in New York will be received up to July 1. This residency is approved for partial credit by the American Board of Pediatrics and is limited to the neoplastic diseases of children. Salary is $4,300 annually plus maintenance. For information write to the Director, Pediatric Service, Memorial Center for Cancer and Allied Diseases, 444 E. 68th St., New York 21.

OHIO

Dr. Mendelsohn Honored.—Dr. Harry R. Mendelsohn, Cincinnati, has received the bronze placque of the Daniel Drake award of the Southwestern Ohio Society of General Physicians. Dr. Mendelsohn was a charter member when the first group of general physicians was organized in Cincinnati in 1945, serving as the first president. He is past-secretary of the Academy of Medicine of Cincinnati, past-secretary of the staff of the Jewish Hospital, and past-secretary of the staff of Our Lady of Mercy Hospital. He was chairman of the committee of one hundred which prepared a revised disaster program for the Academy of Medicine of Cincinnati, and was deputy medical director of the disaster services of the local chapter of the American Red Cross. He is most recent past-president of the National Council of County Medical Societies' Civilian Defense Organization.

Annual Law–Medicine Institute.—Western Reserve University's Law–Medicine Center, sponsored in cooperation with the Cuyahoga County Coroner's Office, has scheduled its fifth annual Institute on Science in Law Enforcement for June 16-21 on the campus in Cleveland. Topics to be presented will include: investigating crime scenes, interrogating suspects, utilizing the scientists, handling juveniles, police administration and supervision, case problems in criminal investigation and personnel matters. Lectures and discussion leaders are selected from local police departments of Greater Cleveland, the Cuyahoga County Coroner's Office, other public officers and the University faculty. Several social events are planned. A luncheon banquet on Saturday, June 21, with presentation of certificates will close the Institute. Tuition is $75 per person. For information contact Oliver C. Schroeder Jr., Director, the Law–Medicine Center, Western Reserve University, Cleveland 6.

SOUTH CAROLINA

Annual State Medical Meeting.—The 110th annual session of the South Carolina Medical Association will be held May 13-15 at the Ocean Forest Hotel, Myrtle Beach. Dr. D. Lesesne Smith Jr., of Spartanburg, will present the president's address May 15. "Current Status of Hypnotherapy in General Practice," a presentation of Dr. William S. Kroger, Chicago, will include two films, "Hypnosis in Obstetrics" and "Hypnoanesthesia in Surgery." A clinicopathologic conference will be conducted by Drs. Eugene A. Stead, Durham, N. C., and E. Arthur Dreskin, Greenville. Papers by out-of-state speakers include the following:

Anesthesia for the Traumatic Surgical Patient, Dr. Charles R. Stephen, Durham, N. C.

Chemopallidectomy for Relief of Parkinson's Disease with Remarks on Selection of Cases for Operation and Improvements in Surgical Technique, Dr. John M. Meredith, Richmond, Va.

Observations on Portal Hypertension, Dr. Nathan A. Womack, Chapel Hill, N. C.

Cesarean Section—Some Unusual Indications, Dr. Isadore Dyer, New Orleans.

Reversible Renal Disease, Dr. Eugene A. Stead Jr., Durham, N. C.

The Bedside Diagnosis of Regular Tachycardias, Dr. Edward R. Dorney, Emory University, Ga.

Exhibits and alumni luncheon meetings are planned. The annual banquet (May 14, 8 p. m.) will feature Major Gen. Leonard D. Heaton, M.C., U. S. Army, Washington, D. C., as speaker. For information write Mr. M. L. Meadors, Secretary, South Carolina Medical Association, 120 Cheves St., Florence, S. C.

TEXAS

Name Chairman of Epidemiology Department.—Dr. Joseph L. Melnick has been named professor of virology and epidemiology and chairman of the department of epidemiology, Baylor University College of Medicine, Houston, effective July 1, 1958. The department of public health and preventive medicine will be reorganized into the department of epidemiology at that time. Dr. Melnick is presently chief of the virology section, Division of Biological Standards, National Institutes of Health. Prior to joining the NIH in 1956, he was on the staff of Yale University, New Haven, Conn. Dr. Melnick is chairman of the World Health Organization Expert Advisory Panel on Virus Diseases and was a corecipient of the International Award for Research in Poliomyelitis given by the Argentinian Foundation Against Infantile Paralysis in 1949.

Dr. Reed Receives Chemistry Award.—Lester J. Reed, Ph.D., research scientist in the Biochemical Institute of the University of Texas, recently received the $1,000 Eli Lilly and Company award in biological chemistry during the national meeting of the American Chemical Society. Dr. Reed was honored for his research on lipoic acid, the functions of vitamins, and the growth essentials for micro-organisms. A special symposium on the "Function of Lipoic Acid" was held April 14 at which Dr. Reed presented his award address, "Some Aspects of the Chemistry and Function of Lipoic Acid." The award, which includes a gold medal and is sponsored by Eli Lilly and Company,

Indianapolis, is presented annually to a chemist who is an American citizen under 36 years of age "to stimulate fundamental research in biological chemistry by young chemists working in the colleges and universities and other nonprofit institutions in the United States."

HAWAII

One Diphtheria Death in Twelve Years.—End of the year figures on communicable diseases for 1957 released by Dr. James R. Enright, chief, Bureau of Epidemiology, Department of Health, Territory of Hawaii, disclosed the first diphtheria death in 12 years and the first diphtheria case since 1954. Dr. Enright reported that the child involved was incompletely immunized. Figures also showed no deaths from poliomyelitis for the first year since 1951. In 1957 ten cases were reported, compared with 46 paralytic cases and 16 nonparalytic cases and 5 deaths in 1956.

GENERAL

Discontinue Supply of Auto ID Cards.—The National Police Officers Association, Chicago, has discontinued temporarily its offer of automobile identification cards for use by physicians on emergency calls. Names of physicians who request cards will be kept on file in case the plan is resumed, according to Gerald S. Arenberg, executive secretary of the association.

Tobacco Industry Research.—A new $500,000 appropriation raises to $2,700,000 the amount the Tobacco Industry Research Committee has made available for scientific research on tobacco and health since 1954. This money is made available to the Scientific Advisory Board to make grants-in-aid to independent scientists studying the problems of cancer and heart disease and the questions that have been raised concerning smoking in connection with health, according to Timothy V. Hartnett, chairman of the committee.

Plastic Surgeons Organize Ohio Valley Society.—Plastic surgeons of Ohio, Indiana, Kentucky, and West Virginia met at the Indiana University Medical Center, Indianapolis, Jan. 20, when they completed organization of the Ohio Valley Plastic Surgery Society. Thirty-three surgeons attended the meeting. Officers elected were Dr. Clifford L. Kiehn, Cleveland, president; Dr. Jacob J. Longacre, Cincinnati, vice-president; and Dr. John M. Tondra, Indianapolis, secretary-treasurer. The first annual convention of the society will be held in Cleveland next year.

Meeting on Psychoanalysis in San Francisco.—The Academy of Psychoanalysis will hold its spring meeting May 11 at the Sir Francis Drake Hotel, San Francisco. A symposium on the "Family Approach" in Psychoanalytic Therapy will be conducted in the morning, with Dr. Roy R. Grinker, Chicago, as chairman and including "Reflections on the Psychoanalytic Approach to the Family," by Dr. Nathan W. Ackerman, New York City, and "Family Homeostasis and Psychotherapy," by Dr. Donald D. Jackson, Palo Alto, Calif. The afternoon session will be devoted to papers by Drs. John P. Spiegel, Cambridge, Mass., and Theodore Lidz and Stephen Fleck, New Haven, Conn. Other participants include: Dr. Stanislaus A. Szurek, Hillsborough, Calif.; Gregory Bateson, Ph.D., Palo Alto, Calif.; Dr. Donald A. Bloch, Washington, D. C., and Dr. Iago Galdston, New York City. Dr. Jules H. Masserman, Chicago, will be chairman at the afternoon session. For information write Dr. Frances S. Arkin, Secretary, Academy of Psychoanalysis, 750 Park Ave., New York 21.

Meeting on Gastroenterology in Washington, D. C.—The World Congress of Gastroenterology and the 59th annual meeting of the American Gastroenterological Association will be held May 25-31 at the Sheraton–Park Hotel, Washington, D. C. A symposium on peptic ulcer followed by a panel discussion will be held May 26, with Drs. Walter L. Palmer, Chicago, and Sara M. Jordan, Boston, as co-chairmen. Congress subjects will be as follows:

Peptic Ulcer.
Malabsorption and Sprue-like Syndromes.
Nutrition and Its Effect on the Liver and Pancreas.
Intestinal Infections and Infestations.
Cancer of the Stomach: (1) Epidemiologic and Experimental Aspects; (2) Clinical Aspects.
Original Contributions.

A ladies' program, scientific exhibits, and postconvention tours are planned. Entertainment includes a symphony night, the congress banquet (May 27), and the association banquet (May 30). Registration fee is $45. For information write Dr. H. Marvin Pollard, University Hospital, Ann Arbor, Mich.

Psychiatrists Meet in San Francisco.—The American Psychiatric Association will hold its 114th annual meeting May 12-16 at the Civic Auditorium, San Francisco. The Academic Lecture, "The Way Ahead," will be given the afternoon of May 13 by Dr. John R. Rees, director, World Federation for Mental Health, London, England. The presidential address, May 12, will be given by Dr. Harry C. Solomon, Boston. The association's Adolf Meyer Research Lecture, "Model Psychoses—Their History, Relevancy and Limitations," will be given by Dr. W. Mayer-Gross, department of experimental psychiatry, Medical School, University of Birmingham, England. About 180 papers and 22 round-table meetings are scheduled. Scientific and technical exhibits and trips to various psychiatric hospitals and clinics, where scientific programs will be presented, are arranged. The annual dinner ($7.50) will be

held May 14, 7:30 p. m. Fee for nonmembers is $5. For information write the American Psychiatric Association, Washington Office, 1700 18th St., N. W., Washington 9, D. C.

Instrument Symposium.—The eighth annual Instrument Symposium and Research Equipment Exhibit, a display of scientific instruments and equipment, will be held May 12-15, at the National Institutes of Health, Bethesda, Md., principal research center of the Public Health Service. This year's display will include developments in surgical, electronic, optical, radiation, and gas-sampling equipment, and the products of more than 100 manufacturers will be exhibited. Twenty papers will be presented at the symposium to be held May 13-15, concurrently with the exhibit. Topics will cover gas chromatography, macromolecules, microrespirometry, aerosols, automatic processing of experimental data, and protein monolayers. The symposium is co-sponsored by the Washington sections of the American Chemical Society, The Instrument Society of America, Society of American Bacteriologists, American Association of Clinical Chemists, Society for Experimental Biology and Medicine, and the Professional Group on Medical Electronics of the Institute of Radio Engineers. For information write James B. Davis, National Institutes of Health, Public Health Service, Bethesda 14, Md.

Meeting of Bronchoesophagological Association.—The American Broncho-Esophagological Association will hold its 38th annual meeting May 21-23 at the Hotel Mark Hopkins, San Francisco. Dr. Walter B. Hoover, Boston, will open the formal sessions with the presidential address. The following topics include invited guests:

Massive Atelectasis in an Asthmatic Child, Drs. Richard B. Aronsohn and Joel J. Pressman, Los Angeles.

Bronchial Adenoma in Childhood, Drs. Charles F. Ferguson and Gordon F. Vawter, Boston.

The Art and Science of Bronchography in Children, Drs. Duane L. Merrill and Paul C. Samson, Oakland, Calif.

Rupture of the Esophagus, Drs. Carleton Mathewson Jr., Roy B. Cohn, and Willis C. Schaupp, San Francisco.

Studies of Esophageal Function—Recent Advances in the Diagnosis of Esophageal Disease, Drs. Arthur M. Olsen and Charles F. Code, Rochester, Minn.

Local or General Anesthesia for Esophagoscopy, Laryngoscopy and Bronchoscopy? Is "Viadril" the Answer?, Drs. Donald S. Bolstad and John W. Ditzler, Detroit.

Obstructing Bronchiolitis: An Acute Medical Emergency, Drs. Edward H. Morgan and John F. Tolan, Seattle.

A dinner for the International Bronchoesophagological Society will be held May 22, 7 p. m. For information write Dr. F. Johnson Putney, Secretary, American Broncho-Esophagological Association, 1712 Locust St., Philadelphia 3.

Annual Meeting of Medical Librarians.—The 57th annual meeting of the Medical Library Association will be held in Rochester, Minn., June 2-6, with headquarters at the Hotel Kahler. The theme will be "Advances in Medical Library Practice." Mr. Thomas E. Keys, librarian of the Mayo Clinic, is convention chairman, and letters of inquiry should be addressed to him. A panel discussion on what the medical specialists expect from the medical library will include speakers from the Mayo Clinic staff. A one-day trip is being planned to Minneapolis and St. Paul with visits to the University of Minnesota, The James J. Hill Reference Library, and the Ramsey County Medical Library. A session on American Medical History and Medical Librarianship is arranged. A preconvention activity, planned for May 31, is a series of refresher courses, and classes will be made up from the following subjects: administration, acquisitions, classification, cataloging, nonbook materials, photoduplication, public relations, reference work, rare books, history of medicine, bibliographic services, periodicals, binding, library architecture, equipment, and medical terminology. Arrangements are being made for pre- and postconvention tours. All medical librarians are cordially invited.

Annual Meeting of Thoracic Surgeons.—The 38th annual meeting of the American Association for Thoracic Surgery will be held May 16-18 in Boston, with headquarters at the Hotel Statler. The first day of the meeting will be dedicated to the memory of Dr. Evarts A. Graham, whose eulogy will be presented by Dr. Thomas H. Burford, St. Louis. The presidential address will be presented May 16 by Dr. Brian B. Blades, Washington, D. C. Over 40 papers are scheduled, including the following by invited guest authors:

Simplified Stationary Screen Pump Oxygenator, Drs. Jerome H. Kay and Robert M. Anderson, Los Angeles.

Cardiac By-Pass Without Artificial Oxygenator, Drs. William T. Mustard, Wolf Sapirstein, and Denise Pav, Toronto, Canada.

Topography of the Human Coronary Arteries Considered in Relation to Cardiac Surgery, Drs. Thomas N. James and George E. Burch, New Orleans.

Satisfactory Surgical Correction of Pectus Excavatum Deformity in Childhood—A Limited Opportunity, Dr. Kenneth J. Welch, Boston.

Hypoventilation, Hypoxia and Acidosis Occurring in Acute Postoperative Period, Drs. Raleigh M. Hood and Arthur C. Beall Jr., Oakland, Calif.

Creation of a Temporary Artificial Ductus in the Surgical Correction of Ventricular Septal Defects Associated with Severe Pulmonary Hypertension—A Two-Stage Operation, Drs. Howard D. Sirak and Don M. Hosier, Columbus, Ohio.

A total of 20 motion pictures will be shown at the daily sessions. The annual banquet will be held May 17, 7 p. m. For information write the American Association for Thoracic Surgery, 600 S. Kingshighway, St. Louis 10, Mo.

Better Hearing Month in May.—Instead of a one-week observance to acquaint the public with the problems of hearing loss, the American Hearing Society, Washington, D. C., has announced Better

Hearing Month for May. The campaign will focus on publicizing ways to prevent deafness, to rehabilitate the hard of hearing, and to alert parents to the need for early detection and prompt medical treatment of hearing loss in young children. The society reports that it is estimated there are 15 million accoustically handicapped persons in this country and that some 3 million of these are children. The extended time will allow flexibility in planning local tie-in programs in the 100 member organizations of the American Hearing Society, located in 32 states, the District of Columbia, and Canada, and more complete coverage of he campaign by volunteer staffs in the respective communities. Current projects of the society are: hearing evaluations for infants and young children; language development for preschool children; hearing testing programs for youngsters in public schools; speech therapy; lipreading; speech correction and auditory training; recruitment of and scholarships for prospective teachers and administrators in the field of hearing and speech; research in the prevention and alleviation of deafness; and stimulation of community action in rehabilitation and vocational placement of persons with a hearing loss. The American Hearing Society, founded in 1919 and now planning its 30th annual educational campaign, is a national nonprofit organization.

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Otologists Meet in San Francisco.—The 91st annual meeting of the American Otological Society will be held May 17-18 at the Hotel Fairmont, San Francisco. The guest of honor, Dr. Ralph A. Fenton, Portland, Ore., will present an address, and half of the formal presentations will include invited guest authors:

Repair and Consequences of Trauma to the Stapes and Oval Window in Experimental Animals, Dr. Richard J. Bellucci and Dorothy Wolff, Ph.D., New York City.

Further Studies on the Function of the Utricular Macula, Drs. Joseph A. Sullivan, Walter Johnson, and James K. B. Smith, Toronto, Ont.

Hydro-Dynamic Origin of Aural Harmonics in the Cochlea, Dr. Juergen Tonndorf, Iowa City, Iowa.

Destructive Labyrinthotomy—A Study of the Prognosis of Postoperative Disability, Drs. Kinsey M. Simonton and Paschal A. Sciarra, Rochester, Minn.

Functional Changes in Inner Ear Deafness, Merle Lawrence, Ph.D., Princeton, N. J.

Differential Diagnosis Between Otosclerosis and Congenital Footplate Fixation, Dr. Howard P. House, Los Angeles, and Dorothy Wolff, Ph.D., New York City.

Neurological Assessment of Some Deaf and Aphasic Children, Dr. William M. Landau, Dr. Hallowell Davis, R. Goldstein, Ph.D., F. R. Kleffner, Ph.D., and S. Richard Silverman, Ph.D., St. Louis.

The Potential Value of Pressures of the Labyrinthine Fluids as Measured with an Electromanometer, Drs. Francis L. Weille, John W. Irwin, and Nelson Kiang, Boston.

For information write Dr. Lawrence R. Boies, Secretary-Treasurer, University Hospital, Minneapolis 14, Minn.

Prevalence of Poliomyelitis.—According to the National Office of Vital Statistics, the following number of reported cases of poliomyelitis occurred in the United States, its territories and possessions in the weeks ended as indicated:

Area	April 12, 1958 Paralytic Type	April 12, 1958 Total Cases	April 13, 1957 Total
New England States			
Maine	..	..	..
New Hampshire	..	..	..
Vermont	..	..	..
Massachusetts	..	..	..
Rhode Island	..	..	..
Connecticut	1	1	..
Middle Atlantic States			
New York	..	1	1
New Jersey	..	..	..
Pennsylvania	..	..	..
East North Central States			
Ohio	..	..	2
Indiana	..	..	4
Illinois	..	..	..
Michigan	..	..	2
Wisconsin	..	..	..
West North Central States			
Minnesota	..	..	..
Iowa	..	..	..
Missouri	..	..	1
North Dakota	..	..	..
South Dakota	..	..	..
Nebraska	1	1	1
Kansas	..	..	..
South Atlantic States			
Delaware	..	..	..
Maryland	..	..	..
District of Columbia	..	..	..
Virginia	..	..	1
West Virginia	..	..	..
North Carolina	..	..	..
South Carolina	..	..	..
Georgia	..	..	3
Florida	1	4	..
East South Central States			
Kentucky	..	..	..
Tennessee	..	..	3
Alabama	..	..	..
Mississippi	..	1	..
West South Central States			
Arkansas	..	..	1
Louisiana	1	1	2
Oklahoma	..	..	..
Texas	2	2	4
Mountain States			
Montana	..	1	..
Idaho	..	..	..
Wyoming	..	..	..
Colorado	1	1	1
New Mexico	..	..	..
Arizona	..	..	1
Utah	..	..	..
Nevada	..	..	..
Pacific States			
Washington	..	2	..
Oregon	..	..	1
California	2	2	5
Territories and Possessions			
Alaska	..	..	..
Hawaii	..	..	..
Puerto Rico	..	..	..
Total	9	17	33

FOREIGN

Hematologists to Meet in Rome.—The seventh congress of the International Society of Haematology will be held in Rome at the Palazzo dei Congressi Sept. 7-13. The official languages of the Congress will be English, French, German, Italian, and Spanish. The preliminary programme includes: 1. Immunohematology; 2. Hemorrhagic disorders; 3. Leukemia; 4. Anemia; 5. Nucleonics; and 6. The spleen and the reticuloendothelial system. The congress of the International Society of Blood Transfusions will be held at the same Palazzo dei Congressi Sept. 3-6. For information write the Segreteria del VII Congresso Internazionale di Ematologia, Instituto di Patologia Medica, Policlinico Umberto I, Roma (Italia).

CORRECTION

Aspergillus Ear Infection.—In the Question and Answer concerning aspergillus ear infection (THE JOURNAL, April 5, 1958, page 1803) in the last sentence of the answer the word creatine should read cresatin, so that this sentence reads as follows: "A 1% thymol concentration in cresatin as ear drops. . ."

EXAMINATIONS AND LICENSURE

EDUCATIONAL COUNCIL FOR FOREIGN MEDICAL GRADUATES, INC.

Educational Council for Foreign Medical Graduates, Inc.: The American medical qualification examination to be given henceforth twice a year for foreign medical graduates. Medical Schools in the United States and Foreign Countries, Sept. 23. Final date for filing application is June 23. Executive Director, Dr. Dean F. Smiley, 1710 Orrington Ave., Evanston, Illinois.

BOARDS OF MEDICAL EXAMINERS

ALABAMA: *Examination.* Montgomery, June 17-19. Sec., Dr. D. G. Gill, State Office Building, Montgomery 4.

ARKANSAS:* *Examination.* Little Rock, June 5-6. Sec., Dr. Joe Verser, Harrisburg.

CALIFORNIA: *Written Examination.* San Francisco, June 16-19; Los Angeles, August 18-21; Sacramento, Oct. 20-23. *Oral Examination.* San Francisco, June 14; Los Angeles, August 16; San Francisco, November 15. *Oral and Clinical Examination for Foreign Medical School Graduates.* San Francisco, June 15; Los Angeles, August 17; San Francisco, November 16. Sec., Dr. Louis E. Jones, 1020 N Street, Sacramento.

COLORADO:* *Examination and Reciprocity.* Denver, June 10-11. Exec. Sec., Mrs. Beulah H. Hudgens, 715 Republic Bldg., Denver 2.

DELAWARE: *Examination and Reciprocity.* Dover, July 8-10. Sec., Dr. Joseph S. McDaniel, Professional Bldg., Dover.

FLORIDA:* *Examination.* Miami, June 29-July 1. Sec., Dr. Homer L. Pearson, 901 N. W. 17th St., Miami.

GEORGIA: *Examination and Reciprocity.* Atlanta and Augusta, June. Sec., Mr. C. L. Clifton, 224 State Capitol, Atlanta.

IDAHO: *Examination.* Boise, July 14-16. Exec. Sec., Mr. Armand L. Bird, 364 Sonna Bldg., Boise.

INDIANA: *Examination.* Indianapolis, June 18-20. Exec. Sec., Miss Ruth V. Kirk, 538 K. of P. Bldg., Indianapolis.

IOWA:* *Examination.* Iowa City, June 16-18. Exec. Sec., Mr. Ronald V. Saf, State Office Bldg., Des Moines 19.

KANSAS:* *Examination.* Kansas City, June 13-14. Sec., Dr. F. J. Nash, New Brotherhood Bldg., Kansas City.

LOUISIANA: *Examination and Reciprocity.* New Orleans, June 5-7. Sec., Dr. Edwin H. Lawson, 930 Hibernia Bank Bldg., New Orleans.

MARYLAND: *Examination.* Baltimore, June 17-20. Sec., Dr. Frank K. Morris, 1211 Cathedral St., Baltimore 1.

MASSACHUSETTS: *Examination.* Boston, July 15-18. Sec., Dr. Robert C. Cochrane, Room 37 State House, Boston.

MICHIGAN:* *Examination.* Ann Arbor and Detroit, June 9-11. Sec., Dr. E. C. Swanson, 118 Stevens T. Mason Bldg., West Michigan Ave., Lansing 8.

MISSISSIPPI: *Examination.* Jackson, June 23-24. *Reciprocity.* Jackson, December. Asst. Sec., Dr. R. N. Whitfield, Old Capitol, Jackson 113.

MISSOURI: *Examination.* St. Louis, May 30-31. Ex. Sec., Mr. John A. Hailey, Jefferson City.

NEBRASKA:* *Examination.* Omaha, June. Sec., Mr. Husted K. Watson, Room 1009, State Capitol Bldg., Lincoln 9.

NEW MEXICO:* *Examination and Reciprocity.* Santa Fe, May 19-20. Sec., Dr. R. C. Derbyshire, 227 E. Palace Ave., Santa Fe.

NEW YORK: *Examination.* Albany, Buffalo, New York City and Syracuse, June 24-26. Sec., Dr. Stiles D. Ezell, 23 S. Pearl St., Albany.

NORTH CAROLINA: *Examination.* Raleigh, June 16-19. *Endorsement.* Raleigh, June 17. Asst. Sec., Mrs. Louise J. McNeill, Professional Bldg., Raleigh.

NORTH DAKOTA: *Examination.* Grand Forks, July 9-11. *Reciprocity.* Grand Forks, July 12. Sec., Dr. C. J. Glaspel, Grafton.

OHIO: *Examination.* June 19-21, Sec., Dr. H. M. Platter, 21 West Broad St., Columbus 15.

OKLAHOMA:* *Examination.* Oklahoma City, June 3-4. Sec., Dr. E. F. Lester, 813 Braniff Bldg., Oklahoma City.

OREGON:* *Examination.* Portland, July 16-17. Exec. Sec., Mr. Howard I. Bobbitt, 609 Failing Bldg., Portland 4.

PENNSYLVANIA: *Examination.* Philadelphia and Pittsburgh, July 8-10. Acting Sec., Mrs. Marguerite G. Steiner, Box 911, Harrisburg.

SOUTH CAROLINA: *Examination.* Columbia, June 24-25. Sec., Dr. H. E. Jervey, 1329 Blanding St., Columbia.

SOUTH DAKOTA:* *Examination.* Rapid City, August 12-13. Exec. Sec., Mr. John C. Foster, 300 First National Bank Bldg., Sioux Falls.

TEXAS:* *Examination and Reciprocity.* Fort Worth, June 23-25. Sec., Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth 2.

UTAH: *Examination.* Salt Lake City, July 9-11. Director, Mr. Frank E. Lees, 324 State Capitol Bldg., Salt Lake City 1.

VIRGINIA: *Examination.* Richmond, June 12-14. *Reciprocity.* Richmond, June 11. Address: Board of Medical Examiners, 631 First St., S. W., Roanoke.

WASHINGTON:* *Examination.* Seattle, July 14-16. Administrator, Mr. Thomas A. Carter, Capitol Bldg., Olympia.

WEST VIRGINIA: *Examination and Reciprocity.* Charleston, July 14-16. Sec., Dr. N. H. Dyer, State Office Bldg., No. 5, Charleston.

WISCONSIN:* *Examination.* Milwaukee, July 8-10. Sec., Dr. Thomas W. Tormey, Jr., 1140 State Office Bldg., 1 West Wilson St., Madison.

WYOMING: *Examination and Reciprocity.* Cheyenne, June 2 and Oct. 6. Sec., Dr. Franklin D. Yoder, State Office Bldg., Cheyenne.

ALASKA:* On application in Anchorage and Juneau. Sec., Dr. W. M. Whitehead, 172 South Franklin St., Juneau.

GUAM: *Subject to Call.* Act. Sec., Dr. S. F. Provencher, Agana.

HAWAII: *Examination.* Honolulu, July 14-15. Sec., Dr. I. L. Tilden, 1029 Kapiolani St., Honolulu.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ALASKA: *Examination.* Juneau, Nov. 4. Sec., Dr. R. Harrison Leer, Room 204, Alaska Office Bldg., Juneau.

CONNECTICUT: *Examination and Endorsement.* New Haven, June 14. Exec. Asst., Mrs. Regina G. Brown, 258 Bradley St., New Haven 10.

FLORIDA: *Examination.* Miami, June 7. Sec., Mr. M. W. Emmel, Box 340, Gainesville.

KANSAS: *Examination.* Kansas City, June 3-4. Sec., Dr. R. E. Stowell, University of Kansas School of Medicine, Kansas City 12.

OREGON: *Examination.* Portland, June 7. Sec., Dr. Earl M. Pallett, Box 5175, Eugene.

SOUTH DAKOTA: *Examination.* Vermillion, June 6-7. Sec., Dr. Gregg M. Evans, 310 E. 15th St., Yankton.

WISCONSIN: *Examination.* Milwaukee, June 7. Sec., Mr. William H. Barber, 621 Ransom St., Ripon.

*Basic Science Certificate required.

GOVERNMENT SERVICES

OFFICE OF DEFENSE MOBILIZATION

Additions to Health Resources Advisory Committee.—Appointment of three additional members to the Health Resources Advisory Committee was announced March 27 by John S. Patterson, acting director of the Office of Defense Mobilization. The new committee members are Leo H. Bartemeier, M.D., Baltimore, Md., medical director, Seton Institute, Baltimore; John Z. Bowers, M.D., Madison, Wis., dean, University of Wisconsin School of Medicine; and George M. Fister, M.D., Ogden, Utah, private practice, regent, University of Utah. The committee, composed of leaders in the health professions from outside the government, advises the Office of Defense Mobilization director on health matters relating to defense mobilization programs. Chairman of the committee is Dr. Elmer Hess, Erie, Pa.

NAVY

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Retirements.—Capt. James R. Sayers, M. C., a native of Waukita, Okla., was placed on the retired list of Naval officers on April 1, 1958, after completing more than 28 years of service.

Capt. Leonard E. Skilling, M. C., native of Chicago, was placed on the retired list as of April 1, having reached the age for statutory retirement.

VETERANS ADMINISTRATION

Personal.—Dr. Saul Fortunoff, director, professional services, VA Hospital, Altoona, Pa., has been appointed manager of the VA Hospital at Dwight, Ill., succeeding Dr. Warren L. Fleck, who retired Feb. 28. The hospital has 215 beds for general medical and surgical patients.

PUBLIC HEALTH SERVICE

Reduction of Poliomyelitis Cases Last Year.—The Morbidity and Mortality Weekly Report of the U. S. Public Health Service, released April 4, shows a reduction of poliomyelitis in 9,287 cases (62.4%) between 1957-1958 and 1956-1957. The reduction for paralytic poliomyelitis was 68.7%, and the reduction for paralytic cases by quarters was as follows: April to June, 57.2%; July to September, 75.2%; October to December, 60.4%; and January to March, 56.8%. The greatest reduction took place during the height of the poliomyelitis season, namely 75%. Although there has been a decrease in the total number of paralytic cases there has been, in general, an increase in the proportion of paralytic to nonparalytic cases reported. The decrease in the proportion of nonparalytic and unspecified poliomyelitis cases reported might be ascribed in part to more caution in diagnosing nonparalytic poliomyelitis.

New Assignments for Medical Directors.—The Public Health Service has announced a series of changes among medical directors assigned to the regional offices of the Department of Health, Education, and Welfare. The changes become effective July 1.

Dr. Francis J. Weber, medical director, Region 8, with headquarters in Denver, Colo., has been appointed chief of the new PHS Division of Radiological Health in Washington, D. C. Dr. Michael Pescor, at present medical director of Region 7, with headquarters in Dallas, Texas, will become medical director of the Denver office. Dr. Richard Boyd, medical director of Regions 1 and 2, stationed in New York City, will assume the same position in the Dallas office.

Dr. Harald M. Graning, medical director of Region 5, in Chicago, will move into the New York City position. Dr. Arthur B. Price, now on loan to the Bureau of Old-Age and Survivors Insurance, Social Security Administration, Baltimore, will become the medical director of the Chicago office.

The medical directors of other regions are Drs. Eugene Gillis, Region 3, Charlottesville, Va.; Will H. Aufranc, Region 4, Atlanta, Ga.; Lewis H. Hoyle, Region 5, Kansas City, Mo.; and Charles F. Blankenship, Region 9, San Francisco.

The medical directors in the regional offices of the Department of Health, Education, and Welfare direct Public Health Service programs of grants and technical assistance and other relationships with the states and territories that comprise each region.

Congress Authorizes New Indian Hospitals.—A total of $1,450,000 was appropriated by Congress for the construction of a new 75-bed Indian hospital at Shiprock, N. Mex., which will serve about 14,000 Indians of the Navajo tribe. Construction is expected to start during the summer.

The Shiprock hospital is one of four new major Indian health medical facilities authorized by Congress. The others will be at Gallup, N. Mex.; Sells, Ariz.; and Kotzebue, Alaska. The facility at Gallup will be the first Indian hospital to be located there; the other three will replace obsolete, crowded buildings inadequate for modern medical service.

DEATHS

Allen, Jacob Porter, Williamsburg, Ohio; Cincinnati College of Medicine and Surgery, 1894; died in the Brown County Hospital, Georgetown, Dec. 19, aged 86.

Anderson, Charles Lee ✱ San Jose, Calif.; Emory University School of Medicine, Atlanta, Ga., 1928; fellow of the American College of Physicians; veteran of World War II; associated with O'Connor Hospital and San Jose Hospital, where he died Feb. 21, aged 54, of dissecting aneurysm of the aorta and arteriosclerosis.

Angear, Benjamin Horace Smith, St. Petersburg, Fla.; Illinois Medical College, Chicago, 1900; at one time practiced in Sublette, Ill., where he served as mayor; died in the Illinois Masonic Home in Sullivan, Ill., Jan. 28, aged 86, of acute coronary occlusion.

Antell, Leon ✱ New York City; Long Island College Hospital, Brooklyn, 1916; member of the American Academy of Pediatrics; associated with Beth David Hospital and the Hospital for Joint Diseases; died March 3, aged 67, of coronary thrombosis.

Ash, Arthur F. ✱ Weehawken, N. J.; Queen's University Faculty of Medicine, Kingston, Ont., Canada, 1901; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; fellow of the American College of Surgeons; associated with St. Mary's Hospital in Hoboken, Margaret Hague Maternity Hospital, and the Christ Hospital in Jersey City, where he died March 9, aged 80, of cerebral thrombosis and arteriosclerotic heart disease.

Barton, Edward Williams Jr., Temple City, Calif.; Stanford University School of Medicine, San Francisco, 1937; veteran of World War II; served on the staffs of the Collis P. and Howard Huntington Memorial Hospital in Pasadena and the Garfield Hospital in Monterey Park; died in the Veterans Administration Hospital, Los Angeles, Feb. 25, aged 51, of cerebrovascular hemorrhage.

Blumgarten, Aaron Samuel ✱ New York City; Columbia University College of Physicians and Surgeons, New York City, 1908; fellow of the New York Academy of Medicine; veteran of World War I; for many years associated with the Lebanon Hospital, where he was past-president of its medical board, and the Lenox Hill Hospital; author of "A Textbook of Materia Medica, Pharmacy and Therapeutics" and "A Textbook of Medicine"; died March 13, aged 71.

Boggs, John Waldo E., Philadelphia; Hahnemann Medical College and Hospital of Philadelphia, 1904; veteran of World War I; served on the staff of St. Luke's and Children's Medical Center; died Feb. 15, aged 77, of bronchopneumonia.

Bond, Benjamin Joseph ✱ Winter Haven, Fla.; Emory University School of Medicine, Atlanta, 1932; veteran of World War II; associated with the Winter Haven Hospital; surgeon for the Seaboard Airline Railroad; died Feb. 28, aged 50, of coronary occlusion.

Bryant, Charles Henry, Tiverton, R. I.; Jefferson Medical College of Philadelphia, 1904; health officer for the town and school physician; veteran of the Spanish–American War; examining physician for draft boards during World War I; past-president of the Rhode Island Public Health Association; served on the staff of the Truesdale Hospital in Fall River, Mass.; died Feb. 28, aged 81, of coronary infarction.

Brzozowski, Grover Stanislaus, San Diego, Calif.; Louisville (Ky.) Medical College, 1907; member of the American Trudeau Society; died Feb. 22, aged 71, of acute coronary occlusion, arteriosclerotic cardiovascular disease, and pulmonary emphysema.

Campbell, Marsden Douglas, Mapleton Depot, Pa.; Jefferson Medical College of Philadelphia, 1904; died in the J. C. Blair Memorial Hospital, Huntington, Feb. 20, aged 77, of arteriosclerosis.

Campbell, William Murphy ✱ Weatherford, Texas; Vanderbilt University School of Medicine, Nashville, Tenn., 1890; member of the American Academy of General Practice; in 1955 was honored when the name of Parker County Hospital was changed to Campbell Memorial Hospital; died March 8, aged 98.

Cashin, John Emerson, University City, Mo.; Hospital College of Medicine, Louisville, Ky., 1893; veteran of World War I; formerly associated with the Veterans Administration in Omaha, Neb., St. Louis, and Jefferson Barracks, Mo.; died in St. Louis County Hospital Feb. 28, aged 87, of myocardial infarction, and pulmonary edema.

✱ Indicates Member of the American Medical Association.

Chisolm, Robert Patrick ✙ Selma, Ala.; Medical College of Alabama, Mobile, 1893; died in the Baptist Hospital Jan. 6, aged 87.

Cook, Walter, Santa Ana, Calif.; University of Louisville (Ky.) Medical Department, 1910; for many years practiced in Pisgah, Iowa; died in Orange Feb. 5, aged 91.

Cranston, Clyde John ✙ Wakeman, Ohio; Western Reserve University School of Medicine, Cleveland, 1924; veteran of World Wars I and II; served on the staffs of the Fisher–Titus Memorial Hospital in Norwalk, Norwalk (Ohio) Hospital, and the Allen Hospital in Oberlin; died Feb. 24, aged 62, of coronary thrombosis.

Crawford, Robert Oliver, El Dorado Springs, Mo.; Barnes Medical College, St. Louis, 1898; served as mayor; died Jan. 26, aged 91.

Dash, George Edward ✙ Boothbay Harbor, Maine; Eclectic Medical Institute, Cincinnati, 1905; member of the American Academy of Pediatrics; formerly on the faculty of his alma mater; formerly practiced in Cincinnati, where he was associated with the Children's Hospital, Bethesda Hospital, Children's Home, and the Catherine Booth Home and Hospital; on the staff of Miles Memorial Hospital in Damariscotta and St. Andrew's Hospital, where he died Feb. 17, aged 74.

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Davidson, James H., Slater, Mo.; University of Louisville (Ky.) Medical Department, 1896; died in the Fitzgibbon Memorial Hospital in Marshall Feb. 6, aged 83, of heart disease.

Davis, David Dexter, Bennington, Vt.; Columbia University College of Physicians and Surgeons, New York City, 1919; member of the Vermont State Medical Society; member of the founders group of the American Board of Surgery; fellow of the American College of Surgeons; served on the faculty of Long Island College of Medicine in Brooklyn; lecturer in surgical anatomy at the Bennington College; a member of the state board of medical registration; veteran of World War I and an officer in the Army from 1928 to 1936; served on the staffs of the Brooklyn and Cumberland hospitals in Brooklyn; chief of surgery at the Henry W. Putnam Memorial Hospital, where he died Feb. 14, aged 65, of coronary heart disease, and uremia.

Davis, Howard Wilcox ✙ Binghamton, N. Y.; Albany (N. Y.) Medical College, 1917; veteran of World War I; past-president of the Broome County Medical Society; fellow of the American College of Physicians; attending physician, Binghamton City and Our Lady of Lourdes Memorial hospitals; consulting internist, Broome County Tuberculosis Hospital in Chenango Bridge and Binghamton State Hospital; died Feb. 23, aged 65, of a ruptured aneurysm.

Dennis, Jeptha Weldon ✙ Auburn, Ala.; Emory University School of Medicine, Atlanta, 1927; veteran of World War II; served as college physician and director of the student health service at the Alabama Polytechnic Institute; member of the American Academy of General Practice; died in the Emory University Hospital in Atlanta, Ga., Feb. 20, aged 54, of mesenteric thrombosis.

Dorsey, Homer Ashford, Pitts, Ga.; Georgia College of Eclectic Medicine and Surgery, Atlanta, 1912; died Jan. 5, aged 68, of coronary thrombosis.

Elterich, Theodore Ottmar ✙ Pittsburgh; University of Pennsylvania School of Medicine, Philadelphia, 1923; specialist certified by the American Board of Pediatrics; member of the American Academy of Pediatrics; clinical associate professor emeritus of pediatrics at the University of Pittsburgh School of Medicine; associated with Children's and St. Margaret's hospitals, and the Allegheny General Hospital, where he died March 2, aged 60, of carcinoma of the stomach.

Fluke, Samuel Bancroft ✙ Harrisburg, Pa.; University of Pennsylvania School of Medicine, Philadelphia, 1928; fellow of the American College of Surgeons; veteran of World War I; for many years associated with the Harrisburg Hospital, where he was past-president of the staff; consulting surgeon to the Harrisburg State Hospital; died March 12, aged 62, of carcinoma of the stomach with metasteses to the lung.

Flynn, Anna Maria, Saratoga, Calif.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1892; formerly practiced in San Francisco; died Feb. 13.

Fortin, William Henry, Helena, Mont.; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1908; for many years associated with the Veterans Administration, retiring Jan. 31, 1950; died Feb. 18, aged 78, of arteriosclerotic heart disease and diabetes mellitus.

Freed, Morris Albert ✙ Philadelphia; Jefferson Medical College of Philadelphia, 1923; died March 9, aged 62.

Garber, Judith Temkin, Stockton, Calif.; Woman's Medical College of Pennsylvania, Philadelphia, 1924; associated with Stockton State Hospital; died Feb. 24, aged 62.

Gibson, Jesse Walter ✙ Lindale, Texas (licensed in Texas, under the Act of 1907); for many years president of the school board; died Feb. 23, aged 90, of arteriosclerosis and chronic pyelomyelitis.

Giddens, Charles C., Valdosta, Ga.; Atlanta College of Physicians and Surgeons, 1907; a director of the First National Bank and the First Federal Savings and Loan Association; died in the Pineview General Hospital Feb. 15, aged 72, of cerebral hemorrhage.

Goddard, Francis Wayland, Valley Stream, N. Y.; Jefferson Medical College of Philadelphia, 1901; for many years a medical missionary in China; fellow of the American College of Surgeons; died March 15, aged 81, of coronary occlusion.

Greene, Mary Theresa, Castile, N. Y.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1890; an associate member of the American Medical Association; for many years served on the Castile High School Board of Education; formerly owner of the Greene Sanitarium; died in Gainesville Feb. 27, aged 91, of abdominal aneurysm with rupture.

Hamilton, Gerald Watson ✱ Akron, Ohio; Rush Medical College, Chicago, 1924; veteran of World War II; died in the Barberton (Ohio) Citizens Hospital Feb. 26, aged 60, of an accidental gunshot wound of the left side of his chest.

Heflin, Wyatt ✱ Birmingham, Ala.; Jefferson Medical College of Philadelphia, 1884; member of the Southern Surgical Association; died Feb. 27, aged 97, of cerebral thrombosis.

Heldring, Elsie Carrie ✱ De Land, Fla.; Jenner Medical College, Chicago, 1907; died Feb. 24, aged 83.

Hicks, Edward A. ✱ Troy, Mo.; Kentucky University Medical Department, Louisville, 1904; formerly county coroner; died in the Deaconess Hospital, St Louis, Feb. 8, aged 86, of arteriosclerotic heart disease.

Ho, Ly Yuen, Kansas City, Mo.; Chinese Medical College, Canton, 1895; died Feb. 28, aged 85, of heart disease.

Holman, Charles Hinds ✱ Carrollton, Miss.; Memphis (Tenn.) Hospital Medical College, 1903; for many years county health officer; died in the University Hospital, Jackson, March 1, aged 77.

Holtzhausser, Ralph Stephen ✱ Philadelphia; University of Pennsylvania School of Medicine, Philadelphia, 1921; veteran of World War I; resident physician at Stetson Hospital; on the staffs of the St. Christopher's Hospital for Children and Philadelphia General Hospital, where he died March 6, aged 60, of carcinoma of the esophagus.

Hughes, Walter Jones, Greensboro, N. C.; Meharry Medical College, Nashville, Tenn., 1918; for a time engaged in venereal disease control with the Mississippi State Board of Health and the North Carolina State Board of Health; later continued the same work with the U. S. Public Health Service; for many years physician at Bennett College; died March 2, aged 64, of a self-inflicted knife wound in his neck.

Hunt, Henry Franklin ✱ Danville, Pa.; born in Madisonville, Tenn., Sept. 22, 1898; Vanderbilt University School of Medicine, Nashville, Tenn., 1924; specialist certified by the American Board of Pathology; founding fellow of the College of American Pathologists; past-president of the American Society of Clinical Pathologists and the Pennsylvania Association of Clinical Pathologists; member of the Society of American Bacteriologists, American Association for Study of Goiter, American Society for the Advancement of Science, and a member of Ex-Resident Physicians of Mayo Clinic; veteran of World War I; formerly served in the pathological department of the Mayo Clinic, Rochester, Minn.; for a long time member of the committee on laboratory approval for the state board of health and on the medical advisory committee to Selective Service for Pennsylvania; consulting pathologist, Northeastern Penitentiary, Lewisburg, from 1931 to 1954; for many years director of clinical laboratories and pathologist at Danville State Hospital; chief pathologist and director of clinical laboratories, from 1929 to 1954 at the Geisinger Memorial Hospital, where he was later medical director and consultant in pathology, and where he died March 4, aged 59, of pulmonary emphysema.

Kaster, Thomas Joseph ✱ Chicago; Rush Medical College, Chicago, 1901; died in the Passavant Memorial Hospital March 8, aged 82, of broncho pneumonia and chronic myelogenous leukemia.

Kramer, Albert A. ✱ South Bend, Ind.; State College of Physicians and Surgeons, Indianapolis, 1907; while in Butler, served as mayor; member of the American Academy of General Practice; died Feb. 20, aged 78, of arteriosclerotic heart disease.

Marks, Lewis Hart, Paoli, Pa.; Medical Department of Tulane University of Louisiana, New Orleans, 1906; died March 10, aged 74, of coronary disease.

Marquardt, Edward William ✱ Elmhurst, Ill.; Rush Medical College, Chicago, 1901; fellow of the International College of Surgeons; helped organize the West Suburban Hospital in Oak Park; founder of the Memorial Hospital of Du Page County, where he died March 7, aged 82.

Marshall, Benjamin Joseph ✱ Major, U. S. Army, retired, Whitfield, Miss.; born Oct. 7, 1870; Memphis (Tenn.) Hospital Medical College, 1894; veteran of World War I; entered the medical corps of the U. S. Army in 1920 and retired May 31, 1934;

for many years associated with the Mississippi State Hospital; at one time superintendent of the Mississippi School for the Blind in Jackson; died in the University Hospital in Jackson, March 8, aged 87, of cerebral arteriosclerosis with occlusion of right middle cerebral artery.

Matveeff, Natalie Ananievna, New York City; Medical Institute for Women, St. Petersburg, Russia, 1912; died Feb. 22, aged 68, of heart disease and cancer of the esophagus.

Max, Samuel ✻ Issaquah, Wash.; Northwestern University Medical School, Chicago, 1916; died in Huntington Park, Calif., Feb. 6, aged 67, of coronary disease.

Morgenstern, David Jacob ✻ Brooklyn; Yale University School of Medicine, New Haven, Conn., 1926; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; died in the Beth El Hospital Feb. 12, aged 61, of coronary thrombosis.

Muller, Wasily Vilhelm ✻ Seattle; University of Oregon Medical School, Portland, 1930; died Feb. 27, aged 60.

Murray, Kenneth Merrival, Scranton, N. D.; University of Toronto Faculty of Medicine, Toronto, Ontario, Canada, 1911; member of the North Dakota State Medical Association; died Dec. 21, aged 78, of coronary occlusion.

Nash, John Frederick ✻ St. Pauls, N. C.; North Carolina Medical College, Charlotte, 1914; member of the American Academy of General Practice; veteran of World War I; died March 9, aged 68.

Newlin, Gladys Wright, Falls Church, Va.; Woman's Medical College of Pennsylvania, Philadelphia, 1913; died in the Garfield Memorial Hospital, Washington, D. C., March 13, aged 67.

Nice, Franklin Mickley Jr., Hamburg, Pa.; Jefferson Medical College of Philadelphia, 1901; served as school director; associated with St. Joseph's Hospital and the Reading Hospital in Reading; died in Miami, Fla., March 1, aged 79, of carcinoma of the gastrointestinal tract.

O'Hare, Edward Sivern, Esmond, N. D.; University of Minnesota Medical School, Minneapolis, 1914; branch line surgeon for the Northern Pacific Railway; died in Tacoma, Wash., Feb. 7, aged 71, of bronchopneumonia.

Olson, Alfred Louis, Stoughton, Wis.; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1906; veteran of World War I; formerly city health officer; died in Madison Feb. 23, aged 81, of bronchopneumonia and myelogenous leukemia.

Oster, Edwin Jurging, Cleveland; Western Reserve University School of Medicine, Cleveland, 1920; died in St. Vincent Charity Hospital Feb. 23, aged 63, of pneumonia and diabetes mellitus.

Parker, Allan Coull, Altman, N. Y.; New York Homeopathic Medical College and Hospital, New York City, 1904; died March 10, aged 81, of myocarditis and cancer of the prostate.

Pow, John Robert ✻ Bessemer, Ala.; University of the South Medical Department, Sewanee, Tenn., 1903; served on the staff of the Birmingham Baptist Hospitals in Birmingham; died in the Spohn Hospital, Corpus Christi, Texas, Jan. 23, aged 78, of myocardial infarction.

Putnam, Claude Eugene, Oklahoma City, Okla.; Memphis (Tenn.) Hospital Medical College, 1909; veteran of World War I; formerly associated with the Indian Service; died Feb. 27, aged 78, of pneumonia.

Rabinowitz, Harold Max ✻ Brooklyn; Cornell University Medical College, New York City, 1908; fellow of the International College of Surgeons and the American College of Surgeons; member of the Endocrine Society; consultant, Maimonides Hospital and Jewish Hospital for Chronic Diseases; died March 9, aged 71.

Ramacciotti, William Stephen ✻ Nebraska City, Neb.; Creighton University School of Medicine, Omaha, 1932; member of the American Academy of General Practice; on the staff of St. Mary's Hospital; died March 3, aged 56, of coronary thrombosis.

Reader, Donald Richard ✻ Minneapolis; University of Minnesota Medical School, Minneapolis, 1939; specialist certified by the American Board of Psychiatry and Neurology; member of the American Psychiatric Association; veteran of World War II; on the staffs of the Glenwood Hills and Homewood hospitals; consultant, State Mental Hygiene Clinic, Fergus Falls, Minn.; died Feb. 20, aged 45, of injuries received in an automobile accident.

Reese, George Hannah ✻ Petersburg, Va.; University College of Medicine, Richmond, 1909; served on the staff of the Central State Hospital; died Feb. 14, aged 73.

Rigler, Robert I., St. Louis; American Medical College, St. Louis, 1902; died Feb. 27, aged 85.

Roberson, Noah Francis ✻ Sparta, Ill.; University of Nashville Medical Department, 1909; on the staff of the Sparta Community Hospital; died Feb. 20, aged 86, of intracranial hemorrhage.

Roberts, Jay Gilbert ✻ Pomona, Calif.; Rush Medical College, Chicago, 1899; specialist certified by the American Board of Otolaryngology; fellow of the American College of Surgeons; veteran of

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World War I; on the staff of the Pomona Valley Community Hospital, where he died Feb. 21, aged 83, of carcinoma of the prostate.

Robertson, David Wilbur ✱ Deputy, Ind.; Medical College of Indiana, Indianapolis, 1887; died in the King's Daughters' Hospital, Madison, Feb. 14, aged 95.

Robinhold, Daniel Guy, Forty Fort, Pa.; Jefferson Medical College of Philadelphia, 1900; an associate member of the American Medical Association; veteran of World War I; for many years president of the board of health of Forty Fort; organizer, director, and vice-president of the Forty Fort State Bank; associated with Nesbitt Memorial Hospital in Kingston, where he died Feb. 15, aged 84, of acute coronary occlusion.

Roles, Charles Leon, Camilla, Ga.; Emory University School of Medicine, Atlanta, 1916; member of the Medical Association of Georgia; died in Atlanta Feb. 23, aged 72, of coronary occlusion.

Rose, Edward Ernest, Huntington, W. Va.; College of Physicians and Surgeons, Baltimore, 1907; veteran of World War I; served as superintendent of the Andrew S. Rowan Memorial Home at Sweet Springs; died March 5, aged 74.

Russell, Martin Van Buren, Hot Springs National Park, Ark.; Chattanooga (Tenn.) Medical College, 1904; specialist certified by the American Board of Otolaryngology; served on the staff of the Warner Brown Hospital in El Dorado; died in St. Joseph's Hospital Feb. 18, aged 77, of coronary occlusion.

Ryland, Caius Tacitus ✱ Lexington, Mo.; Beaumont Hospital Medical College, St. Louis, 1897; past-president of the Missouri State Medical Association and the Lafayette County Medical Society, of which he was secretary; veteran of World War I; during World War II an examiner for the Lafayette County Selective Service Board; on the staff of the Lexington Memorial Hospital; died Feb. 16, aged 83, of bronchogenic carcinoma.

Schatz, Leo Harry ✱ Portland, Ore.; University of Oregon Medical School, Portland, 1925; died in the Holladay Park Hospital Dec. 13, aged 61, of coronary occlusion and carcinoma of the left kidney.

Schiewe, Paul Reuben, Astoria, Ore.; University of Oregon Medical School, Portland, 1945; an associate member of the American Medical Association; veteran of World War II; past-president of the Clatsop County Medical Society; on the staff of Columbia and St. Mary's hospitals; died Feb. 25, aged 37.

Schuck, Philip ✱ St. Louis; Marion–Sims College of Medicine, St. Louis, 1897; died in the Incarnate Ward Hospital Feb. 15, aged 87.

Schwartz, Sidney ✱ Modesto, Calif.; Stanford University School of Medicine, San Francisco, 1938; found dead in bed Feb. 3, aged 47.

Sharp, William Lowery ✱ St. Louis; St. Louis College of Physicians and Surgeons, 1904; veteran of World War I; found dead in bed Jan. 30, aged 79.

Shaw, Frank Longfellow, Steuben, Maine; Jefferson Medical College of Philadelphia, 1887; died in the Eastern Memorial Hospital, Ellsworth, Jan. 19, aged 93, of cerebral hemorrhage.

Simonetti, Ernesto Arturo, Mount Vernon, N. Y.; Regia Università degli Studi di Roma. Facoltà di Medicina e Chirurgia, Italy, 1921; member of the Medical Society of the State of New York; member of the board of health; chief cardiologist, St. Joseph's Hospital in Yonkers; cardiologist at Mount Vernon Hospital; died March 8, aged 60, of coronary thrombosis.

Smith, Herbert Gordon ✱ Palo Alto, Calif.; McGill University Faculty of Medicine, Montreal, Que., Canada, 1923; specialist certified by the American Board of Ophthalmology; veteran of World War II; for many years on the faculty of Stanford University School of Medicine in San Francisco; died Feb. 4, aged 57, of coronary thrombosis.

Squier, Beulah Loretta Mansfield, Napa, Calif.; Hahnemann Medical College of the Pacific, San Francisco, 1895; died in the Parks Victory Memorial Hospital Feb. 6, aged 87, of cerebral hemorrhage.

Stafford, George Mason Graham, Baton Rouge, La.; Medical Department of Tulane University of Louisiana, New Orleans, 1901; veteran of the Spanish–American War; formerly coroner, and member of the school board of Rapides Parish; served as superintendent of the State Colony for the Feebleminded in Alexandria; died in the Baton Rouge General Hospital Feb. 11, aged 82, of acute congestive heart failure.

Stats, Daniel, New York City; New York University College of Medicine, New York City, 1936; specialist certified by the American Board of Internal Medicine; member of the Medical Society of the State of New York; on the staff of the Mount Sinai Hospital, where he died March 10, aged 45, of coronary thrombosis.

Stephens, Richmond ✱ New York City; born in New Brighton, N. Y., April 27, 1890; Columbia University College of Physicians and Surgeons, New York City, 1913; specialist certified by the American Board of Orthopaedic Surgery; member of the Connecticut State Medical Society, American Orthopaedic Association, and the American Academy of Orthopaedic Surgeons; fellow of the Ameri-

can College of Surgeons; veteran of World War I; attending orthopedic surgeon at the Hospital for Special Surgery and the New York Hospital in New York City; consultant in orthopedic surgery, Norwalk (Conn.) General Hospital, Stamford (Conn.) Hospital, Yonkers (N. Y.) General Hospital, St. Joseph's Hospital in Stamford, Conn., Waterbury (Conn.) Hospital, and the Danbury (Conn.) Hospital; died in Newtown, Conn., March 17, aged 67, of a malignant tumor of the cecum.

Stewart, Homer Lockett ✙ Navasota, Texas; born in Longview, Texas, Aug. 9, 1897; University of Texas School of Medicine, Galveston, 1924; fellow of the American College of Surgeons; secretary of the Grimes County Medical Society; member of the Southern Medical Association and Pan American Association of Ophthalmology; a member of the school board; veteran of World War I; chairman for 10 years of the board of trustees for the International Organization of Odd Fellow Homes in Corsicana and Ennis; associated with Brazos Valley Sanatorium; for five years on the staff of Hurst Eye, Ear, Nose, and Throat Hospital in Longview; died Jan. 29, aged 60, of coronary thrombosis with infarction.

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Strauss, Abraham, Philadelphia; Jefferson Medical College of Philadelphia, 1910; specialist certified by the American Board of Dermatology and Syphilology; member of the American Academy of Dermatology and Syphilology; associate in dermatology at his alma mater; past-president of the Philadelphia Dermatological Society; associated with the Jefferson Medical College Hospital, where he died March 3, aged 70.

Strock, Charles Stewart ✙ Verbena, Ala.; Vanderbilt University School of Medicine, Nashville, Tenn., 1904; died in the Chilton County Hospital, Clanton, Jan. 24, aged 81, of pyelonephritis.

Vann, Foy ✙ Norfolk, Va.; Medical College of Virginia, Richmond, 1905; member of the American Academy of Orthopaedic Surgeons; past-president of the Virginia Orthopedic Society; died March 15, aged 76, of carcinoma of the lung.

von Domarus, Gunter Walter Eilhard Alfred ✙ New York City; Thuringische Landesuniversitat Medizinische Fakultat, Jena, Thuringia, Germany, 1922; member of the American Psychiatric Association; died in the Beth David Hospital Feb. 25, aged 64, of primary carcinoma of the colon, liver metastases, and secondary anemia.

Wall, Harvey Monroe ✙ Windsor, Mo.; Washington University School of Medicine, St. Louis, 1908; veteran of World War I; served as a member of the board of education and as city physician; a member of the board of directors and a vice-president of the Citizens' Bank of Windsor; died in the Windsor Hospital Jan. 17, aged 73, of hypertension and coronary occlusion.

Warner, George R. ✙ Denver; Gross Medical College, Denver, 1898; died Dec. 25, aged 85, of nephritis and congestive heart disease.

Wilkins, John G., Atlanta, Ga.; Southern Medical College, Atlanta, 1898; for many years member of the city health department; died Feb. 2, aged 83, of asthmatic heart condition.

Wood, Sterling Charles, Clanton, Ala.; Vanderbilt University School of Medicine, Nashville, Tenn., 1917; veteran of World War I; for many years practiced in Uvalde, Texas; died in Birmingham Jan. 4, aged 62, of carcinoma of the liver and pancreas.

Woolsey, Doris Lee Surles ✙ St. Louis; Duke University School of Medicine, Durham, N. C., 1939; interned at Baltimore City Hospital and St. Mary's Hospital in East St. Louis, Ill.; served a residency at Barnes Hospital, St. Louis; certified by the National Board of Medical Examiners; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; fellow of the International College of Surgeons; instructor of clinical otolaryngology at Washington University School of Medicine; associated with McMillan and St. Joseph's hospitals; died Feb. 13, aged 44, of injuries received in an automobile accident.

Zentmayer, William, Merion Station, Pa.; born in Philadelphia Oct. 28, 1864; University of Pennsylvania Department of Medicine, Philadelphia, 1886; emeritus professor of ophthalmology at University of Pennsylvania Graduate School of Medicine in Philadelphia; an associate member of the American Medical Association and in 1916-1917 chairman of its Section on Ophthalmology; member of the American Academy of Ophthalmology and Otolaryngology; member and past-president of the American Ophthalmology Society, which in 1948 awarded him the Howe Medal, and the Association for Research in Ophthalmology; member of the Philadelphia Academy of Natural Sciences, the Pennsylvania Academy of the Fine Arts, and the Ophthalmology Society of the United Kingdom; in 1945 awarded the Leslie Dana Gold Medal of the St. Louis Society for the Blind; a director of the National Society for Prevention of Blindness; consulting surgeon at Wills and St. Mary's hospitals; on the editorial board of the *A. M. A. Archives of Ophthalmology;* died March 18, aged 93, of a heart attack.

FOREIGN LETTERS

BELGIUM

Tropical Asthenia.—The incidence of tropical asthenia has increased in the Belgian Congo to an alarming degree, and its frequency is greatest in areas of greatest Europeanization. The added load on a nursing staff that is numerically always insufficient entails hurried treatments and lowered standards of patient care. This asthenia is the early stage of a complex metabolic and endocrine disturbance and is characterized by easy fatigability, general weakness, pain and extreme weariness in the extremities, feeling more tired on arising than when retiring, alternating unnatural drowsiness and insomnia, headache, vertigo, a fall in pulse pressure, anorexia, and loss of weight. The hematologic findings are usually within normal limits. Lambillon (*Journal of Bruxelles-Medical*) stated that the treatment of choice for these patients was until recently desoxycorticosterone acetate but its use in the dosage required is attended by such undesirable side-effects as edema and headache. Norandrostanolone phenylpropionate was found to bring about rapid improvement without provoking any of the side-effects observed after corticoid administration.

The Free and Controlled Medical Profession.—At the meeting of the Belgian Society for International Medical Law, Professor de Busscher stated that, as a consequence of the hasty and ill-considered institution of social insurance, many physicians are behaving like the newly rich of postwar years. This is deplorable, since good medical practice calls for respect, confidence, and esteem for the profession from the public. The physicians as a class have neither asked for nor favored this innovation which was introduced without consulting them. The correction of this situation certainly does not consist in committing a second and even worse error, namely, nationalization under which the masses would have to be satisfied with a caricature of free consultation. The speaker was opposed to all control exercised on medical practice and asked for the gradual restoration of freedom in the medical profession. He added that the laity should not allow feelings of unconscious hatred, often based on a limited personal experience, to lead them into a generally unprofitable and disastrous action. The speaker insisted that in the medical field a so-called act of omission should be judged only by a competent physician. No disguised communistic device should corrupt the free exercise of professional behavior.

Cancer of the Ear.—Guns and Minet (*Scalpel*, November, 1957) reported a series of 128 patients with cancer of the ear with a follow-up of 11 years. Of these, 105 had cancer of the external ear, 5 of the retroauricular nodes, 9 of the external auditory canal, and 9 of the middle ear. The average survival of these patients was two years. The prognosis in patients with epithelioma of the tympanum was much worse than for those with cancer of the auditory canal. The treatment, either surgical or by irradiation, is only palliative. Cancer should be considered in middle-aged patients with recurrence of ear polyps, especially if followed by otorrhea. All polyps of the tympanum should be removed and examined microscopically. Cancer of the middle ear, as well as cancer of the auditory canal, frequently begins with otorrhea. Cancer in the deepest part of the auditory canal causes early and severe pain. Deafness in these patients is mostly of the conduction type.

BRAZIL

Subtotal Gastroduodenectomy.—At a meeting of the Associação Paulista de Medicina, Dr. Oscar C. Leite and co-workers of the São Paulo Hospital dos Comerciarios described the first human patient in whom a new technique was used to restore the transit through the digestive tract after subtotal gastroduodenectomy. The intent of this preliminary report was to stimulate others to try and to evaluate this procedure. The authors believe that patients with gastric cancer, or cancer and ulcer of the upper part of the small curvature of the stomach, are the best candidates for the new operation. Their patient, a 60-year-old man, was admitted because of an epigastric burning distress and rapid loss of weight. His erythrocyte count was 2,060,000. No abdominal tumor was palpable. Roentgenograms suggested a gastric ulcer, probably malignant, causing stenosis. On operation an enlarged stomach with a mobile tumor measuring 10 by 8 cm. was found in the antrum, with invasion of the fundus and the small curvature. The tumor was isolated after intercoloepiploic separation, the pedicle of the

The items in these letters are contributed by regular correspondents in the various foreign countries.

liver was dissected, and the pyloric artery was ligated. The duodenum was deliberately cut, the two openings being adequately protected. Transposition of the first jejunal loop through the transverse mesocolon and section of the loop 6 cm. distal to the muscle of Treitz were performed. A terminoterminal anastomosis of the duodenum and the distal jejunal loop was made. The gastric coronary artery was ligated, and the stomach was sectioned 3 cm. below the cardia with two catgut planes of suture of one-half of the stomach opening in order to narrow it to the dimension of the mouth of the proximal jejunal loop. The anastomosis was completed and the two small intestinal loops were fixed to the mesocolon.

The postoperative period was smooth, with absence of nausea and vomiting, feeding on the second day, and a very little hemobiliary drainage. On the fifth postoperative day the erythrocyte count was 4,260,000. The patient left the hospital three weeks after the operation. Before discharge, the report of an x-ray examination was as follows: Large gastrectomy with exclusion of the pyloric antrum, the angular region, and a part of the vertical portion of the stomach; gastroenteroanastomosis well permeable to the contrast medium; the opaque substance, as it reached the duodenal arc was subjected to peristaltic and antiperistaltic movements and passed to the small intestinal loops through the horizontal and the descendant portions of the duodenum. Anatomically and physiologically the duodenal arc behaved in a manner similar to that of the gastric antrum, with a slight slowing in the to and fro movement of the contrast meal. The patient did not complain of nausea, and no reflux to the stomach was observed.

Botulism.—Botulism has been identified for the first time in Brazil at Porto Alegre. Nine persons who had eaten canned fish became gravely ill with symptoms suggestive of botulism. They were treated at the municipal Hospital de Pronto Socorro, but seven died. The causative agent was suspected after bacteriological examination and culture of the canned fish and was finally identified as Clostridium botulinum type A through the use of antibotulinic specific serum rushed from the Pasteur Institute of Paris. The serum was also used for the treatment of two of the patients who recovered.

The Expulsive Stage of Labor in Multiparas.—Dr. J. Adeodate Jr. (*Anais brasileiros de ginecologia*, vol. 45, p. 83, 1958) studied the records of 1,000 consecutive deliveries of multiparas. The age of the patients, known in 905 cases, was below 18 years in 1 case, from 19 to 27 in 501, and 28 years or more in 403. The duration of the expulsive stage could be studied only in 599. Of the rest some had to be surgically delivered, some were already in the expulsive stage on admission, and in some expulsion progressed so silently that it was impossible to recognize the moment when the dilatation of the cervix was completed. The expulsive stage lasted less than 30 minutes in 438 patients (73.1%), from 30 to 59 minutes in 113 (18.9%), from 60 to 119 minutes in 36 (6.0%), and more than two hours in 12 (2.0%). The delivery was natural in 873 cases, surgically completed in 59, corrected in 59, and induced in 9. The surgical operations performed were cesarean section in 23, forceps applications in 22, pelvic extraction in 6, embryotomy in 4, version in 1, and other operations in 3. There were no maternal deaths, but fetal death occurred in 67 deliveries. In view of the fact that in more than 90% of the multiparas the expulsive stage was completed within an hour and that in more than 70% it was completed within half an hour, the author stressed that the delay of this stage in multiparas is due to fetal cephalic engagement, while in primiparas it is due to perineal resistance. A labor of more than an hour in multiparas is not a reason for extractive procedures whenever the fetal head is above the superior strait. In most patients the engagement dystocia resolves itself spontaneously, but in others the position of the fetus must be corrected.

FRANCE

Treatment of Cavitary Tuberculosis.—In *La presse medicale* (vol. 66, p. 393, 1958) Paul Veran and coworkers stated that they gave continuous and prolonged treatment with cycloserine alone in a daily dose of 1 Gm. to 60 patients with cavitary tuberculosis who had previously had a prolonged course of major antibiotics. The results proved deceptive in every respect. Improvement in the general and functional conditions was much less marked and less lasting than with the usual antibiotics. Whereas the number of positive cures were minimal (3 of 60), the number of failures and aggravations reached 70%. The slight improvement was most marked at the end of the second month, but often between the fourth and eighth months there was a return to the initial status or an exacerbation. The susceptibility of the organisms to cycloserine gradually decreases in one-half of the patients, with no possibility of correlation between the slow development of the in vitro resistance on the one hand and the usual failure of the therapy on the other. The neuropsychiatric manifestations were lessened by a constant combination with phenobarbital. There were no severe epileptic or psychic accidents. The tolerance was satisfactory in inveterate alcoholics. The changes in the electroencephalogram were more commonly seen in the patients with intoler-

ance with neuropsychiatric disorders. The presence of electroencephalographic abnormalities was not a contraindication to treatment with cycloserine.

Action of Chlorpromazine on the Electroencephalogram.—P. Laget and co-workers (*La presse medicale* vol. 66, p. 395, 1958) studied the effects of chlorpromazine on the electroencephalogram of 30 normal infants aged from 15 days to 2½ years. The drug was given in a dosage of 2 to 5 mg. per kilogram of body weight for several days by mouth or 1 mg. per kilogram intramuscularly 90 minutes prior to taking the electroencephalogram. In 10 of the infants there was no alteration in the waking or sleeping tracing. In the remaining 20 the drug caused slight alterations in the waking tracing (in 5 a slight flattening and in 15 a moderate slowing and increase in voltage of the basic rhythm). The sleeping tracing, however presented only a slight diminution in the voltage of the slow elements. In those infants in whom some alterations in the waking tracing occurred, these were ascribed to variations in the consciousness level (depression in watchfulness or presomnolence). In no case did chlorpromazine cause abnormal elements to appear in the tracing. The authors compared these observations with the experimental data on animals and ascribed the action of the drug to its depressive effect on the activating reticular formation. The drug seems to be useful in infantile electroencephalography inducing physiological sleep with no overcharge of the tracing.

NETHERLANDS

Tolerance of Fats in Hepatic Diseases.—A correlation has long been accepted between the use of fatty meals and gastrointestinal disturbances or biliary colics in patients with hepatic diseases. M. P. v. d. Grinten (*Nederlandsch tijdschrift voor geneeskunde*, vol. 102, p. 172, 1958), however, found that many patients observe no improvement after omitting fat from their diet. On the other hand a colic is almost never observed after a test meal consisting of several eggs or some olive oil. In view of these facts the author investigated the subjective tolerance and the absorption rate for butter, margarine, and olive oil in patients with various hepatic diseases. With the exception of one patient, none had any trouble after the ingestion of up to 100 Gm. of one of these fats. One patient with a total obstruction of the common bile duct complained of nausea. There appeared to be no decrease in the absorption of these fats in patients with uncomplicated cholelithiasis or in those with hepatitis as soon as the color of the stools returned to normal. Malabsorption was seen in patients with biliary obstruction, biliary fistula, and cirrhoses with obvious icterus, and in those in the early stage of hepatitis when the stools were still clay-colored. Even in the presence of a total obstruction of the biliary tract, about 50% of the fat ingested was absorbed, a fortunate circumstance for the patient's general state of nutrition in those with protracted illness. These investigations did not include all types of fats and fatty acids. In view of the present investigation, however, it seems justified to give most patients with hepatic disease a diet containing up to 100 Gm. of butter, margarine, or olive oil.

Q Fever.—Although the regular import of cows and sheep from Q fever-infected countries might be expected to give rise to a regular occurrence of this disease among patients and cattle in the Netherlands, Dekking and Zanen (*Nederlandsch tijdschrift voor geneeskunde*, vol. 102, p. 65, 1958) found that Q fever in the Netherlands is very rare among man and absent among cattle. Since 1954 more than 6,000 serum specimens of patients with atypical pneumonia were investigated for antibodies against this disease. Until 1956 all these reactions were negative. In the last three months of that year, however, three patients, all living and working at Rotterdam, were found with serologic evidence of Q fever. The source of these infections, the first detected in this country, remained obscure. One patient might have been infected by sheep, but neither the sheep nor the shepherds showed any antibodies in their serum. The second patient, a slaughterhouse-worker, might have been infected by British, Yugoslav, or Hungarian cattle, but only three of 193 workers at the same slaughterhouse had antibodies in their serum. The third patient might have been infected in Switzerland. No contact in time, food supply, or social activity could be established between these three patients. In the same period, 150 sheep serums and 595 cattle serums from different sources in the Netherlands were investigated. All reactions were negative or only faintly positive for Q fever.

SWITZERLAND

New Compound Against Leprosy.—A new treatment for leprosy was tested on 167 patients in Nigeria by T. F. Davey (*Leprosy Review*, January, 1958). It was BDPT (4 butoxy-4'dimethylaminodiphenyl thiourea) and appeared to combine freedom from toxic side-effects with a high therapeutic effectiveness. In a dose of 25 to 40 mg. per kilogram of body weight, its activity is as great as that of the sulfones and sometimes surpasses it. After 32 months of observation there was no evidence of the development of drug resistance. Drug hypersensitivity and psychosis were not encountered. On

the basis of the experience so far, BDPT is considered to be the drug of choice when an alternative is needed to the sulfones. It can be combined safely with both sulfones and isoniazid and is particularly valuable in treating children. For large scale use, however, something more is needed than high therapeutic activity and lack of toxicity. The dose of BDPT is relatively large, and, apart from its inconvenience, this adds to the cost of treatment. When given twice weekly the results, though often adequate, are not generally as good as when daily treatment is given. For these reasons BDPT is not applicable to many situations. A drug with such outstanding qualities should, however, be within the reach of patients everywhere, particularly those in whom sulfones give poor results.

UNITED KINGDOM

Financing the Health Service.—A sounder financial future for the National Health Service as a result of the increased contribution was forecast in the House of Commons during a debate on the National Health Service Contributions Bill. Mr. Walker-Smith, Minister of Health, said that though the contributor would pay more he would get good value. Much of the increase is primarily a reflection of inflationary tendencies in the economy as a whole. There was a gratifying increase in the number of new hospitals and extensions. In spite of economic difficulties the amount of money which could be made available for capital works is increasing. The cost of operating hospitals accounted for about 54% and drugs for about 10% of all Health Service expenditures. For 1958-1959 the estimated cost of drugs was $207 million, or more than twice the amount in the initial year of the service. Efforts have been made to influence the prescribing habits of physicians and to control the prices of manufacturers.

Dr. Summerskill (Socialist Opposition) said the bill showed the administrative ineptitude of the government and that a minister should satisfy himself that the heavy spending services were using money to the best advantage before being panicked into demanding further sums from the poorest people in the country. She attacked the drug houses in 1956 because she felt there was an abuse of the health service. In that year the average cost of a prescription rose from 64 to 77 cents. It had now risen to 84 cents. She inveighed against the high-powered salesmanship which induces physicians to prescribe and patients to demand expensive proprietary drugs for which there is a cheaper equivalent. Mr. Houghton (Socialist) urged that to meet the growing health service burden there should be a "butchery on the roads" tax on motorists, an extra tax on heavy smokers to stop them in their headlong rush towards cancer, and an "over-eating" tax, to be levied on expensive meals at restaurants and hotels, for those who overeat, largely at the taxpayers' expense. In three months 177 persons in London did not collect the spectacles made for them at a cost to the National Health Service of $798.

Infected Eggs.—Attention was again drawn to the dangers of infection from using imported processed egg (*Monthly Bull. Min. Health Lab. Serv.* **17**:36, 1958). Large quantities of spray-dried and liquid egg are imported from China, Holland, and Australia. Of 20,000 samples analyzed, 5 to 29% were found to be infected with Salmonella thompson, Salmonella typhimurium, Salmonella paratyphi B, and other pathogenic species of Salmonella. A close correlation between the numbers of strains of each species isolated from processed eggs and the numbers causing human salmonellosis was observed. The frequent occurrence of Sal. thompson in imported egg was reflected in a high incidence of human enteritis due to this organism, which was present in the Chinese and Australian eggs. This species was rarely seen in imported processed egg during World War II, when most of it was imported from the United States, and where this organism is uncommon. The presence in Chinese eggs of Sal. paratyphi B raises a public health problem. It is not present in hens or ducks and can only occur in egg products as a result of human contamination. Many outbreaks of paratyphoid in Great Britain have been traced to the consumption of synthetic cream. Although not made from processed eggs here is every opportunity for infection to be conveyed from the latter to a cream mix in an unhygienic bakery or catering establishment. The frequency of human salmonellosis has doubled in the last few years. This might be reduced by the pasteurizing of egg products at the source or before distribution, as is done in Poland, where infection from processed egg is unknown.

Penicillin Dust and Penicillin Resistance.—The proportion of penicillin-resistant strains of Staphylococcus pyogenes var. aureus is increasing among carriers in hospital who are not receiving penicillin. This is usually explained by postulating a free interchange of organisms between the treated patients and these carriers. This presupposes that the penicillin-resistant organism is able to replace the naturally occurring penicillin-sensitive strains. Gould (*Lancet* **1**:489, 1958) considers that this explanation is most unlikely. He showed that penicillin dust is widely distributed in the environment of a hospital using it. The amount recovered in different parts of the building varies but is greatest nearest those rooms where penicillin is handled or

administered, as in the pharmacy, the wards, and the outpatient departments. Leakage from the vial during puncturing, clearing of air bubbles and froth from syringe and needles, and escape of spray when syringes are being washed frequently occur. Other sources of contamination are the insufflation of wounds and topical application. Air is thus contaminated directly by droplet nuclei from droplets atomized from syringes and the like and indirectly by the raising of dried spilled penicillin as dust. Gould recovered 35 mcg. of penicillin per 100 cu. ft. of air in the hospital dispensary and up to 50 mcg. from the air of the minor surgery room. He showed by air sampling that contamination readily occurs from syringes and the manipulation of penicillin.

The penicillin carrier rate of the hospital staff exceeded 60%, and all the physicians and nurses who were carriers harbored penicillin-resistant strains. Appreciable amounts of penicillin were shown to gain access to the nares of persons working in a hospital environment. Such persons are continually exposed to recontamination with staphylococci, most of which, in a hospital, are penicillinase-producing strains. Penicillin-resistant strains therefore find it easy to establish themselves and to colonize the nares of a larger number of persons in hospital than in other environments not containing penicillin dust, and where the nares of most carriers of Staph. pyogenes var. aureus are colonized with penicillin-sensitive strains. The view that environmental penicillin is an important factor in the widespread colonization of hospital carriers with penicillin-resistant staphylococci was confirmed by observations in a penicillin factory. High concentrations of the antibiotic were found in the air and dust, and workers exposed to penicillin had as high a carrier rate of penicillin-resistant Staph. pyogenes var. aureus as hospital personnel.

Preoperative Bedside Chats.—Surgeons of the Croydon, London, groups of hospitals are making it a practice to chat with the patient the night before an operation. After various topics are talked about, the conversation veers round to the operation. The patient is told in simple words what the operation is and why it is necessary. This chat makes the patient feel that the surgeon is a friend and that he can be relied on to carry out the operation successfully. It also makes the patient feel that the surgeon has a personal interest in him. At their monthly meeting the Croydon Group Hospital Management Committee were told of the success of the scheme, which may be adopted in other hospitals.

Fourteen Cents a Visit.—One physician in the National Health Service estimated that he received 14 cents per item for service. He declined a second-hand verbal request to see a child suffering from a cold, on the ground that the child was well enough to come to his office. On receiving a note from the mother threatening to report him to the executive council he informed her that he would no longer treat the family. This meant a loss of just under $20 a year in capitation fees, but he decided it was worth it. The family of two adults and six children had been on his list for just under two years, during which time he received $33.80 in fees from the health service for all of them. In this time he rendered 100 items of service to the family, including 29 visits involving 75 miles of travel. Deducting the expenses of the practice from this amount left the doctor with 14 cents per visit or consultation.

Carbutamide in Young Diabetics.—Smellie (*Brit. M. J.* 1:553, 1958) examined the effect of carbutamide on children with diabetes of recent onset and little or no ketosis. The drug had a hypoglycemic action in the children and in two of them was associated with a reduction in the glycosuria, but such effects were only produced with relatively high and potentially dangerous blood sulfonamide levels, and evidence of sulfonamide intoxication soon developed. One child developed polyuria, polydipsia, and an erythematous rash, necessitating stopping treatment. In another child the blood platelet and leukocyte count fell, and the symptoms of diabetes returned. A third child showed a progressive clinical deterioration, in spite of a fall in the urinary glucose level. Insulin had to be reintroduced after two weeks. Smellie concluded that carbutamide has no place in the treatment of the diabetes of children, even if the disease is of recent onset.

Disease in Men in Their 60's.—Little is known about the morbidity of men in their 60's. Brown and coworkers (*Brit. M. J.* 1:555, 1958) examined the records of 1,062 men between the ages of 60 and 69, who underwent a medical examination for life insurance. Of these men 20% were free from demonstrable disease, and in nearly half of the remainder no disability was present. The incidence of disease and disability increased with age. The frequency of severe disability, defined as one which would restrict or prevent employment, rose from 10% at age 60 to 61, to 20% at age 68 to 69. The incidence of disease and disability was related to social class, which was defined according to occupation, the proportion of men with disease increasing regularly from 67% in the professional and managerial class to 86% among unskilled laborers.

The incidence of six of the eight commonest diseases (bronchitis, coronary disease, defective hearing, defective vision, hypertension, and peptic ulcer) was also related to social class. Except in the case of coronary disease, which affects the professional classes more than others, the incidence of disease increased with the lowering of the social

scale. The incidence of chronic bronchitis was the same in all ages and in all social groups in the non-smokers, but in the smokers it increased with the lowering of the social class, being over twice as much in laborers as in the professional group. An attempt was made to assess fitness for full-time employment. By the 66th year 75% of the men were still doing full-time work and in the 70th year 50%, financial need being the overriding reason for this. The proportion considered medically unfit for work was 10% for the whole decade, 15% for those above retirement age (65 to 69), and 25% of those at age 69. Chronic bronchitis was the chief cause of diability, followed by hypertension and coronary artery disease. In men over the age of 65 the extent of ill-health was closely related to occupation, being greater in those in the unskilled and semiskilled classes. It was concluded that at least 75% of the men worked beyond the age of 65 given the opportunity and a financial incentive, and that 90% were physically capable of doing so.

Brandy Prescribable Under Health Service.—A physician may prescribe brandy under the National Health Service if he thinks the patient needs it. This decision was upheld by a board of referees appointed by the Ministry of Health. They said that as the amounts required are small, a physician would not require more than a quart of brandy a year. A physician appealed against the Middlesex Executive Council's ruling that brandy is not a drug prescribable under the National Health Service. The council maintained that rectified spirit would serve the same purpose and should be used instead. The doctor concerned had given nine prescriptions, each containing a small amount of brandy. After a similar appeal in 1957 the board held that gin could be prescribed under the service.

Vaccines and the Common Cold.—J. M. Ritchie (*Practitioner* **180**:356, 1958) reported that over a period of about 20 years a series of autogenous vaccines given to sufferers from chronic colds without encouragement and on their insistence, had appeared to give some protection. As an explanation he considered that the function of the virus might be initially to depress the resistance of the patient, giving the nasopharyngeal flora a free hand to upset the balance normally maintained. If this stage could be controlled the duration of the common cold would be cut to 24 to 48 hours of a clear nasal discharge. In the winter of 1955-1956, a series of 109 volunteers, receiving weekly doses of autogenous vaccine prepared from their saliva, was compared with a control group of 75 who received a carbolized saline solution only. The percentage of colds in the controls was six times that of the vaccinated group. It was then decided to try minimal doses of the appropriate antibiotic locally on a short-term basis at the time of invasion, the idea being to depress the activity of the nasopharyngeal flora to correspond to the assumed depression of resistance due to the virus. A series of 1,000 volunteers were so treated in the winter of 1956-1957, the controls being given an inert tablet. Tablets were given only when a patient reported the initial stages of a cold. The results were similar to those in the first experiment: the percentage of colds was seven times as high in controls as in those receiving antibiotic tablets, although the percentage of prodromal symptoms was much the same in both groups.

Respiratory Complications of Influenza.—In an analysis of 125 patients with respiratory complications of influenza, W. C. Walker and co-workers (*Lancet* **1**:449, 1958) reported that Staphylococcus pyogenes was isolated in all the 6 patients with fulminating cases of pneumonia and from 9 of the 15 patients who died. Only 45% of the strains of Staphylococcus pyogenes isolated were sensitive to penicillin. Of the penicillin-resistant strains, 75% were sensitive to streptomycin, 94% to chloramphenicol, 75% to tetracycline, and all were sensitive to erythromycin. Superinfection with staphylococci occurred in 12 patients. Respiratory obstruction developed in 9 of the 125 patients. Six patients with laryngotracheitis had relatively mild obstructive features, and three—all with fulminating staphylococcic pneumonia—had almost total obstruction of the trachea and bronchi. The six with mild cases all recovered without tracheotomy, but this was performed in two of the three with severe cases, and undoubtedly saved life. Tracheotomy is preferable to repeated bronchoscopy. The authors believe that corticosteroids have no place in the routine treatment of the respiratory complications of influenza. When severe asthma or adrenal insufficiency coexists it is rational to use them, and when the patient has been receiving them for some other condition it is important to increase the dosage during the period of stress. Three deaths occurred among the 42 patients with bronchitis and bronchiolitis and 12 among the 69 with pneumonia.

Occupational Mortality.—The Registrar General's Supplement on Occupational Mortality, based on the 1951 census, just published, indicates that tuberculosis, syphilis, cancer of the stomach, bronchitis, and pneumonia all show a steady mortality gradient rising from a low death rate in social class 1 (professional) to a high rate in class 5 (unskilled workers). The same is true of cancer of the lung for men and of cancer of the cervix uteri for women. The converse holds true for poliomyelitis in both sexes, coronary disease in men and cancer of the breast in women. Diseases which appear to have no relation to social grouping include

nephritis among men and vascular lesions of the central nervous system and coronary disease among women. There is one interesting exception to the general rule that maternal death rates rise steadily from class 1 to class 5. This is that farmers' wives appear to have a relatively high risk of dying from diseases of pregnancy and childbirth—a tendency not present to the same extent in the wives of farm laborers. Coal miners have exceptionally high standardized mortality ratios (S. M. R.) from cancer of the stomach and exceptionally low ratios for cancer of the lung and poliomyelitis. Printers and bookbinders have an apparently high death rate from leukemia. Shop owners have relatively greater mortality than their assistants from coronary disease and suicide, but the assistants die more often from tuberculosis. On the whole, physicians fare pretty well. Their S. M. R. was 89, compared with 106 for 1930 to 1936. They had a relatively high ratio for coronary disease (159), but this was not much higher than that for ministers of religion (152) and for lawyers (121). Much has been made of poliomyelitis as an occupational hazard of physicians. Their S. M. R. for this disease was 800, or eight times as many deaths as expected from this cause, but lawyers had seven deaths from poliomyelitis instead of only one expected, so there was little to choose between the two professions. This will take a little explaining on the part of the epidemiologists and illustrates the dangers of rushing into print on the basis of a few figures. Diseases in which physicians had a high S. M. R. included psychoses (200), suicide (226), cirrhosis of the liver (240), and cholelithiasis and cholecystitis (250).

Yttrium-90 and Hypophysectomy.—A method is described by G. A. Edelstyn and co-workers (*Lancet* 1:462, 1958) for destroying the pituitary gland completely by surgical hypophysectomy followed by intrasellar irradiation with the oxide of Yttrium-90 (Y^{90}) in wax. Surgical hypophysectomy was performed. When as much of the gland as possible had been removed the fossa was packed with 7.5 to 10 mc. of Y^{90} mixed with dental impression wax. Of 25 patients with advanced mammary carcinoma so treated, 20 survived operation and 16 were greatly improved. Of the five patients who died postoperatively, four were aged 60 or more, and three had severe pulmonary involvement preoperatively. All but one (94%) of those with blood-borne metastases improved.

Adult Scurvy.—Eleven patients (10 men and 1 woman) with adult scurvy seen between 1951 and 1957 were reported by R. H. Cutforth (*Lancet* 1:454, 1958). All but one were living alone. A history of deficient vitamin C intake was obtained in every case. The presenting symptoms were pain and stiffness in the legs, anorexia, and lethargy. Bruising was the most characteristic sign. Typical scorbutic lesions of the gums were seen in only one patient, but only four had any teeth. Nine were anemic, and in six the hemoglobin level was less than 55%. There was no correlation between the severity of the anemia and the degree of extravasation of blood into the tissues. Ascorbic acid, in doses of 600 to 700 mg. a day, was given to all the patients. Five of them received a standard ward diet, ascorbic acid, and no other treatment. The remaining six were also given ferrous sulfate and vitamin B complex. The symptoms and signs improved promptly. All the anemic patients, whether on ascorbic acid alone or on vitamins B and C with iron, responded at the same rate, and there seemed to be little difference between the two groups.

WORLD HEALTH ORGANIZATION

Health Protection for Air Travelers.—The number of air travelers on scheduled flights throughout the world increased from 2,500,000 in 1937 to 90 million in 1957. This tremendous growth and the fact that aircraft now carry up to 100 passengers may soon overtax the facilities at many international airports, including sanitary equipment, according to the WHO Expert Committee on Sanitation of International Airports. In regard to airports, the International Sanitary Regulations, as set up by WHO, refer expressly to such quarantinable diseases as smallpox, cholera, and yellow fever, and deal with safe water supplies, disposal of waste, and the control of insects, rats, and other disease carriers. WHO also recommended improving measures at international airports for the control of other diseases carried by food, water, or insects. Air passengers must be given the best possible hygienic protection, but the committee recognized that the health of crew members is even more important for safety in flight. It is difficult to replace crews en route, and if their health is not protected by all possible means, particularly in regard to illness with sudden onset such as food poisoning and dysentery, not only does the risk of delays in flight arise but also that of emergency landings and, consequently, of hazards to the passengers.

Only rarely do rats board an aircraft, but, if they do, they can gnaw through aluminum and puncture plastic tubing in a frantic search for food and water, and they have been known to gnaw through wires on aircraft. There is plenty of justification for going to great trouble and expense to keep them out of airports and aircraft, but it is not an easy task, for rats can jump 2 ft. vertically, burrow 2 ft. into the ground, climb smooth pipes up to 3 in. in diameter, and travel along horizontal wires. The necessity of a thorough search for rat nests can be seen from the fact that nesting rats have been found in hollow runway markers.

CORRESPONDENCE

HISTORY OF PATIENT WITH SPONTANEOUS REMISSION OF DIABETES

To the Editor:—A dramatic remission of the symptoms and signs of diabetes mellitus with severe ketosis was reported in a woman, aged 68 (*J. A. M. A.* **152**:1531 [Aug. 15] 1953). In the previously described episode, coma persisted for five days with impressive laboratory evidence of profound ketosis. This included hyperglycemia of 1,170 mg.%. To reverse the laboratory signs of ketosis, 1,425 units of insulin were required in the first 24 hours. On the sixth day of this episode the patient awakened without any psychic or neurological symptoms or signs other than complete amnesia for the period of unconsciousness. There were no residual signs of disease. Her general condition was that of a normal woman of 65 years. Fundoscopy gave normal findings for a patient of her age. Within one week she achieved and maintained clinical aglycosuria and normoglycemia with complete absence of any symptoms of diabetes on an equivocal dose of 10 units of insulin and a weighed diet.

The insulin therapy was discontinued five weeks after the patient's admission. At that time no stigmata of diabetes were detectable. She could eat limitless amounts of sugar and starches without her blood or urinary sugar being elevated to clinical levels. Exhaustive loading tests showed a normal tolerance for glucose. Her neurological status was free from any abnormality. Radiologic and ophthalmological examinations, measurements of steroid excretion, and reaction to insulin gave no evidence of hypophysial disease. Studies of adrenal, thyroid, hepatic, renal, and pancreatic functions yielded figures well within the normal range. From these data we had no reason to postulate a Houssay phenomenon in our patient (John, *J. A. M. A.* **85**:1629 [Nov. 21] 1925; Kotte and Vonderabe, *J. A. M. A.* **114**:950 [March 16] 1940; Levin, *Ann. Int. Med.* **40**:1230 [June] 1954).

Evidences for other possible causes of improvement in the symptoms and signs of diabetes mellitus such as the syndrome described by Kimmelstiel and Wilson (nonspecific glomerular nephropathy), liver disease (cirrhosis), or myxedema were also lacking. The patient was discharged from the hospital Aug. 21, 1952. Because of queries from all parts of the world regarding the subsequent course of this patient and because of the prediction of a prominent authority that she would have to return to insulin within two weeks, this woman's subsequent course is presented.

This Negro woman was readmitted to the Cook County Hospital of Chicago for reevaluation in October (50 days after her first hospital stay) and in November (90 days after her first hospital stay). Her findings remained unchanged. On a diet with a glucose equivalent of 410 Gm., she continued to remain clinically aglycosuric, excreting less than 2 Gm. of glucose in 24 hours. She has remained generally well since her comatose episode four years ago. Her diet had been unrestricted since her release from the hospital in 1952. She made monthly visits to the diabetic clinic. Two years and eight months after her first hospital stay, she complained of frequency of urination and weakness (March, 1955). Glycosuria and a moderate (200 mg.%) elevation of her fasting blood sugar level were detected.

She was placed on a diet with a glucose equivalent of approximately 180 Gm. She required 30 units of protamine zinc insulin to maintain an aglycosuric and normoglycemic state. After she had used this diet and dose of insulin in October, 1955, a test of her tolerance to glucose yielded 197 mg.% of glucose in the serum while fasting, 221 mg.% 30 minutes after ingesting 100 Gm. of glucose, 240 mg.% at 60 minutes, and 272 mg.% at two hours (in contrast to 100 mg.%, 124 mg.%, 200 mg.%, and 158 mg.% in July, 1952). Serum glucose readings during the (insulin-reduced) aglycosuric status were 142 mg.% (before breakfast), 138 mg.% at 10 a. m., and 138 mg.% at 4 p. m. Other studies of the serum yielded NPN, 41 mg.%; protein, 7.2 Gm. (of which 4.3 Gm. was albumin); inorganic phosphorus, 4.3 mg.%; total cholesterol, 302 mg.%; alkaline phosphatase, 1.7 Bodansky units; icterus index, 14 units; cephalin flocculation, plus 2; thymol turbidity, 4.7 MacLagan units; and gamma globulin turbidity, 1.26 Gm.%. The radioactive iodine uptake was 16%. An ophthalmological study yielded no ocular signs of diabetes. There was a grade II atherosclerosis in the retina. The hemoglobin level was 90% with 7,100 leucocytes having a normal distribution. The urine had a specific gravity of 1.018 when clinically free of glucose. Proteinuria was reported in one analysis. There were no abnormalities in the heart on physical examination. The electrocardiogram was normal. The blood pressure was 170/100 mm. Hg. These findings were approximately unchanged in the most recent hospital checkup in January, 1957.

A less dramatic report (Harwood, *New England J. Med.* **257**:257 [Aug. 8] 1957) has appeared since the first report of our patient. An adequate explanation of the marked deviation from normal physiology, subsequent apparently complete recovery and relapse into a mild, chronic diabetic state, is not at present available. It would seem that assumption of a primary disturbance in the islet physiology would be over-simplification.

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RUSSIAN STAMPS

To the Editor:—In commenting on the Russian stamp of 1956 honoring Benjamin Franklin (*J. A. M. A.* **166**:1081 [March 1] 1958), Prof. Nathaniel Kleitman calls attention to the two stamps issued by Russia in 1949 honoring I. P. Pavlov (1849-1936), the great Russian physiologist. Russia has also honored other physiologists—in 1956 with a three-color 40-kopek commemorative for I. M. Sechenov (1829-1905), "Founder of Russian Physiology," and in 1957 with a brown commemorative for William Harvey (1578-1657), on the tercentennial of his death. The latter shows Harvey in the Royal College of Physicians portrait, reversed.

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JOB RESPONSIBILITY AND CORONARY ARTERY DISEASE

To the Editor:—We are heartened by both the splendid article of Pell and D'Alonzo which appeared in the Jan. 25, 1958, issue of The Journal, page 332, and the later critical comments of Dr. Russek in the March 22, 1958, issue, page 1508, if only because both sets of investigators are determined to study the possible role of job responsibility in the pathogenesis of clinical coronary artery disease.

Although we would agree with Dr. Russek's implication that occupational titles may be misleading, nevertheless, if Pell and D'Alonzo continue to find that the executive and managerial group of their company fails to exhibit a greater morbidity of clinical coronary disease than lesser paid groups, they have excellent cause indeed to absolve this higher echelon as a group from the blight of increased susceptibility to the disorder in question. Such a result would not justify, however, the conclusion that socioeconomic stress does not play an important role in clinical heart disease. This is so because the responsibility and the stress of a job can be gauged differently by the community at large and by the individual jobholder himself. It is only the latter evaluation, however, that can bear any possible relevance to the disorder under investigation.

However, as Dr. Russek has implied, we too are finding that the two possible evaluations of job responsibility are not too frequently consonant. Unfortunately, perhaps, this really means that large epidemiologic surveys in which each subject is not studied and analyzed for his own evaluation of and also his emotional reaction to his particular job or jobs may well be completely misleading. Admittedly, intimate and personal contact between investigator and a number of subjects is a tedious and irksome task, but perhaps, for conclusive results to be obtained, the actual number to be so studied need not be too large. As the eminent mathematical physicist, C. G. Darwin, observed, "In most matters concerned with probability, 3 or 4 count as small numbers, 10 as a fairly large number, and 100 as a very large number."

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MEDICAL FILM REVIEWS

Head and Neck Anatomy Series: 16 mm., color, sound. Demonstration by Harry Sicher, M.D., Loyola University School of Dentistry, Chicago. Produced in 1957 by the Medical Illustration Service of the Veterans Administration West Side Hospital, Chicago. Procurable on loan from Central Office Film Library, Veterans Administration, Washington 25.

Part 1. Superficial Structures and Boundaries of the Carotid Triangle: Showing time 21 minutes. This film is concerned with the progressive dissection of the structures superficial to the carotid triangle and the demonstration of its boundaries.

Part 2. The Carotid Triangle: Showing time 20 minutes. The boundaries of the carotid triangle are shown, and the important structures contained within are exposed.

Part 3. The Submandibular and Submental Triangles: Showing time 24 minutes. The boundaries of each triangle are exposed, and the important structures within are demonstrated.

Part 4. The Parotid Gland and Facial Nerve: Showing time 24 minutes. Included in this film is a systematic dissection, layer by layer, showing the parotid gland in its relationship to other structures, facial nerve, and its branches.

These films show excellent dissection and are well demonstrated. The photographic quality is good; however, for better understanding and orientation, more low power shots and occasional diagrammatic drawings are suggested. In the first film, the dissection was performed on the right side and the introductory diagram was of the left. This series of films is extremely valuable in undergraduate as well as postgraduate teaching and seems to cover an area in which good motion pictures are lacking. The material covered is neither too complete nor too complex for first-year medical and dental students. Therefore, for first-year students, the films could be used for review purposes after the completion of dissection. Postgraduate students in otolaryngology and dentistry could use these films for an introductory review before dissection.

MEDICAL LITERATURE ABSTRACTS

INTERNAL MEDICINE

Hiatus Hernia: Its Incidence and Clinical Significance. E. Hafter. German M. Month. 3:1-4 (Jan.) 1958 (In English) [Stuttgart, Germany].

The author reports on 159 men and 141 women, between the ages of 21 and 71 years, with hiatus hernia, the size of which varied from 2 to 12 cm. (¾ to 4½ in.). There was a characteristic triad of symptoms: local symptoms limited to the retroxiphoid or epigastric region, symptoms due to failure of the diaphragmatic sphincter mechanism (incontinence of the cardia), and esophageal symptoms after reflux of the gastric contents. All these symptoms depend on the patient's posture; recumbent position or raising the intra-abdominal pressure brings on the symptoms, while an upright position results in their disappearance. Roentgenologic evidence of the hiatus hernia was obtained during the expiration phase, with the patient in the recumbent position, by filling the terminal portion of the esophagus with a mixture of barium and 1% solution of carboxymethyl cellulose, 1 tsp. of which was swallowed 20 and 10 seconds before the exposure. In cases of reversible hernia, prolapse of the stomach through the hiatus should be obtained by suitable positioning of the patient or by raising the intra-abdominal pressure. In doubtful cases, the patients should be subjected to 3 methods of roentgenologic examination, i. e., in the right oblique prone position on the Bucky table, in the straight prone position on the Bucky table with epigastric compression, and in the left oblique supine head-down (Trendelenburg) position.

It was estimated that about 10% of the patients with upper abdominal symptoms, who underwent roentgenologic examination of the stomach, had hiatus hernia, as compared with 18% who had cholelithiasis and 13% who had duodenal ulcer. In most of the patients with hiatus hernia, symptoms first appeared after they had passed the age of 50 years, but the diagnosis often was made several years later. Congenital cases are known to occur. Hiatus hernia was associated with other diseases in 159 of the 300 patients; cholelithiasis was observed most frequently, but this might have been a coincidence without pathogenetic relationship. The relatively frequent association with gastrointestinal diverticulosis may have been more than coincidental.

Conservative treatment was practiced in most of the patients. It consisted of a propped-up position in bed during the night, avoidance of heavy evening meals, and taking antacids, antispasmodics, and sedatives. Most of the patients obtained relief of their complaints. Twenty-five patients in whom surgical intervention was indicated by such complications as hemorrhage and stenotic esophagitis or by severe symptoms refractory to conservative treatment were operated on. Of 19 patients in whom the thoracic approach was used, 8 became free of complaints, the condition of 5 was improved, and 6 were therapeutic failures. Of 6 patients in whom the abdominal approach was used, 5 became free of complaints and 1 was a therapeutic failure. These rather disappointing results correspond with those reported by other workers. Surgical treatment should be practiced only in exceptional cases, particularly when complications occur.

Treatment of Undulant Fever. J. T. Gost. Lancet 1:191-192 (Jan. 25) 1958 [London].

When the new antibiotic, cathomycin, was supplied to the author for treating infections resistant to penicillin, he decided to try it in undulant fever. After treating the first few patients, he realized that this antibiotic is a specific for undulant fever. Up to now cathomycin has been used in 26 patients, who have been discharged from hospital completely cured, and not one has had a recurrence. Of the 26 patients treated, 20 had a positive blood culture on admission, and the remaining 6 had a positive agglutination test. Only the 20 patients with a positive blood culture are discussed here. Undulant fever was at its height when treatment was started. During the first 5 days of treatment no change was apparent; the pyrexia continued as before, and the symptoms remained just the same; but almost always on the 5th day the pyrexia resolved by crisis, and all the symptoms (headache, insomnia, articular pain, anorexia, and sweating) disappeared. By the end of the treatment the spleen returned to its normal size and shape, no matter how large it was. No relapse occurred. The usual

The place of publication of the periodicals appears in brackets preceding each abstract.

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dose for adults was 0.25 Gm. every 4 hours until the day after the crisis, and then every 6 hours, to a total of 18 Gm. The author feels that with cathomycin the battle against brucellosis will be won.

Hereditary Autosomal Hemorrhagic Disease with Insufficiency of Antihemophilic Globulin and Prolonged Bleeding Time. I. M. Nilsson. Nord. Med. 59:12-16 (Jan. 2) 1958 (In Swedish) [Stockholm].

Six women from 4 families presented an atypical form of inherited hemorrhagic diathesis, not sex-linked, characterized by deficiency of antihemophilic globulin and simultaneous prolonged bleeding time. Definite reduction of antihemophilic globulin in several maternal relatives was established. Intraveous treatment of the first patient with a special purified human fraction I containing antihemophilic globulin gave good normalization. The hereditary bleeding disorder in these patients is distinguishable from von Willebrand's thrombopathy and from classic hemophilia A. Observations indicate that the prolonged bleeding time depends on the absence of a plasma factor rather than on disturbances in the capillary wall.

Suction Biopsy of the Gastric Mucosa: A Report on 10 Years' Experience. J. Tomenius. Acta med. scandinav. 159:353-367 (No. 5) 1957 (In English) [Stockholm].

The author examined histologically more than 600 suction biopsy specimens of the gastric mucosa which were obtained with the aid of a specially constructed instrument from 250 ambulant patients, 2 to 3 specimens being taken in each case. The instrument was based on the principle that a small strip of the mucosa of the stomach was sucked into a chamber in which a cylindrical knife was thrust downwards to cut off the specimen. The manufacturers of the instrument made it possible to reduce its diameter to between 13 and 14 mm., i. e., to about the same diameter as that of most of the flexible gastroscopes. By attaching the biopsy instrument to such a gastroscope, it has become possible to perform the suction biopsy under visual control and to take biopsy specimens at every gastroscopic examination without risk, provided that the indications and the contraindications for gastroscopy with an ordinary flexible gastroscope have been observed. No complications with hemorrhage or other sequelae were observed in any of the 250 patients. Since the gastrobiopsy instrument is a delicate tool, all instructions concerning its cleaning must be carefully followed.

The greatest value of gastric biopsy is not in diagnosis of cancer of the stomach. Only isolated cases of tumor depend on this diagnostic method. Negative biopsy findings in patients in whom cancer is suspected should not be considered decisive. Gastric biopsy performed in a diagnostic department with reliable roentgenologic service serves, as a rule, only to confirm the diagnosis. Gastrobiopsy findings are of much greater importance in the differential diagnosis between gastritic lesions and normal mucosa. Advanced atrophy but with decreased transparency due to interstitial hypertrophy can be diagnosed only with the aid of biopsy.

The histamine secretion test has proved to be of diagnostic value when it reveals hydrochloric acid secretion values of 90 to 100 mEq. With this level of acidity, the mucosa may be considered with great probability to be normal, i. e., not to be attacked by gastritic lesions. The gastric mucosa may, however, be normal with hypersecretion; gastritis may also occur with hydrochloric acid secretion values below 90 to 100 mEq. Histological examination of the biopsy specimens revealed a normal mucosa in 3 patients with achlorhydria. Hydrochloric acid secretion values over 120 mEq. are proof of the absence of diffuse gastritis. Lowered acidity does not prove the absence of gastritis, not even in the case of achlorhydria. Roentgenologic examination does not tell whether gastritis is present.

Appreciable eosinophil infiltration of the gastric mucosa was detected by suction biopsy in 15 patients. In 2 of the 15 patients there were tumor-like structures that were interpreted at the roentgenologic examination as cancer. Gastric biopsy revealed the true nature of these structures as tumor-like eosinophil infiltrates. Thus, it became possible to spare these patients an operation which otherwise would have been considered indicated, since the roentgenograms suggested cancer.

Leukemia and Related Conditions and the Blood-Uric-Acid. R. A. Hickling. Lancet 1:175-178 (Jan. 25) 1958 [London].

The relationship between a high uric acid level of the blood and megakaryocyte-like giant cells in the bone marrow and in the tissues affected by myeloid metaplasia appears to be a reciprocal one. This is because, when a leukemia-like disease develops in a patient who has had gout for years, it is an atypical leukemia, often an "erythroleukemia," the leukocytes not reaching "leukemic" numbers, and the tissue changes are those of "megakaryocytic myelosis," sometimes with sclerosis of the bone marrow in addition to large numbers of megakaryocyte-like giant cells. This is of great importance in considering the etiology of leukemia, because few conditions are known to cause myeloid metaplasia, the essential feature of myeloid leukemia. These statements are based upon observations of the uric acid levels of the blood in 58 patients with myeloid splenomegaly. Seventeen of

these patients had myeloid leukemia, 10 had polycythemia, and the remaining 31 had myeloid splenomegaly associated with osteosclerosis, myelosclerosis, megakaryocytic myelosis, and similar conditions. A high uric acid level of the blood was closely associated with the presence of large numbers of megakaryocyte-like giant cells in the bone marrow and the spleen. Blood uric acid levels may be used as a guide to the type of myeloid metaplasia present, and the gradual change among some of the conditions mentioned above, e.g., from polycythemia to megakaryocytic myelosis and from megakaryocytic myelosis to myelosclerosis may be followed by determining the uric acid levels of the blood. When a leukemia-like disorder appears in a patient who has had gout for years, the histological changes in the bone marrow and the spleen are those of megakaryocytic myelosis.

Lymphatic Leukemia: Tabulations on 2910 Cases Treated with Chemicals. J. R. Sampey. J. South Carolina M. A. **54**:53 (Feb.) 1958 [Florence].

Reviewing hundreds of clinical reports published since 1949 on lymphatic leukemia, the author found data on 2,910 patients who had been treated with chemical agents. The number of patients undergoing chemotherapy is considerably in excess of this total, since many publications covered in this tabulation gave no figures on the numbers undergoing treatment. The following remission rates were achieved: with radiophosphorus, 35%; with nitrogen mustard, 50%; with triethylene melamine (TEM), 64%; with corticotropin and cortisone, 64%; with folic acid antagonists, 51%; with 6-mercaptopurine (6-MP), 64%; and with urethane, 63%. Many other chemicals have been tried, and the incidence of remissions indicates that a number of them should be given a more extensive trial.

Hereditary Spherocytosis: Important Features. A. Schrumpf. Nord. med. **59**:22-26 (Jan. 2) 1958 (In Norwegian) [Stockholm].

In hereditary spherocytosis a peculiar morphologic variation of the red blood corpuscles occurs. Inheritance is dominant but not sex-linked. The 30 persons with the disease treated since 1938 all presented characteristic clinical and laboratory features. These features are as follows: The platelets are spherical in form and thicker than normal in relation to the diameter. Few cells are true spherocytes; most of them are simply thicker than normal. While the normal lifetime of erythrocytes is from 100 to 120 days, the spherocytes disappear after 8 to 15 days. When the lifetime of erythrocytes is thus reduced to one-eighth of the usual period in a quiet phase of the disease, neoformation of red blood corpuscles must be increased 8 times to compensate for the destruction. Three important but divergent clinical pictures are to be reckoned with: (1) the anemia crisis, (2) disease of the biliary tract and retention, and (3) hepatitis.

The serum iron level was normal or elevated in 13 out of 14 patients examined. Electrophoretic examination of the blood of 5 patients whose hemoglobin was the type resistant to denaturation by alkali showed a single hemoglobin component in all; the alkaline denaturation was normal in 4 patients and slightly increased in 1 patient. Coombs's test, carried out in 18 patients, gave negative results. The osmotic resistance of the red blood corpuscles was reduced except in 1 patient with hepatitis. The chief pathogenetic factor in hereditary spherocytosis is the abnormal red blood cell and not hypersplenism. The hypertrophy of the spleen is due to an increased functional demand. The consensus of opinion today is that removal of the spleen is the only effective treatment. Splenectomy was done on 23 of the patients, with no deaths. The youngest patient at the time of operation was 8 months old; the oldest was 50 years old. The operation should be performed by a surgeon skilled in the intervention. A secondary spleen should be looked for, because, if a secondary spleen is overlooked, the disease will recur. The prognosis for life saving is usually good, except for the dangerous anemia crisis which can occur. The prognosis for complete recovery is best when the spleen has been removed.

Reliability of Electrocardiographic Diagnosis of Left Ventricular Hypertrophy. A. Selzer, C. L. Ebnother, P. Packard and others. Circulation **17**: 255-265 (Feb.) 1958 [New York].

The presence and degree of left ventricular hypertrophy observed at autopsy on 550 patients who had died, and from whom electrocardiograms had been obtained during life, were correlated with the electrocardiographic findings in these patients. The electrocardiographic diagnosis of left ventricular hypertrophy had been made in 108 patients in whom the tracings showed the pattern of left ventricular hypertrophy according to currently accepted electrocardiographic criteria. This diagnosis was confirmed by autopsy findings based on heart weights in 75 patients; it was considered questionable in 16 patients and was not confirmed in 17. A careful analysis of the findings in the 17 patients with normal cardiac weights was made, and it was found that in none of these was there a known cause for cardiac hypertrophy, nor was there significant cardiac disease present. Most of the patients in this group died of malignant disease and showed considerable emaciation.

The value of the 3 principal groups of electrocardiographic criteria, namely, increased voltage, prolonged ventricular activation time, and abnormalities of the ST-T part of the ventricular com-

plex, was examined not only in the light of confirmed and false-positive diagnoses but also according to the incidence of these criteria in patients with mild, moderate, and severe left ventricular hypertrophy determined by cardiac weight. The prolonged ventricular activation time was found to be the least reliable sign, having been present in many patients with a false-positive electrocardiographic diagnosis and absent in some patients with severe hypertrophy. Increased voltage of precordial leads, the most sensitive of the criteria, was present in most of the patients. It was also, however, most frequently responsible for a false-positive diagnosis of left ventricular hypertrophy. The depression of S-T segments, and the flattening and inversion of T waves in leads showing the highest electropositive deflections, when added to the other 2 groups of criteria, materially increased the specificity of the diagnosis. However, the relationship between the extent of the electrocardiographic abnormalities and the severity of hypertrophy is only fair. It is believed that the inaccuracies in the electrocardiographic diagnosis are inherent in the method and demonstrate the fact that conventional electrocardiography registers in a rather crude way the electric forces of cardiac action, being influenced, in addition, by such extraneous factors as body build, vagaries of anatomic position of the heart, degree of insulating effect of outside structures, and probably other, as yet unknown, factors.

The findings of the study strongly suggest that presently available electrocardiographic criteria for the diagnosis of left ventricular hypertrophy appear to be moderately satisfactory. They have to be applied, however, with the understanding of their limitations; it is necessary to accept them as an expression of probability rather than as a diagnosis of left ventricular hypertrophy. The disappointing inaccuracy of electrocardiography in the field of diagnosis of early left ventricular hypertrophy is emphasized.

Aortic Stenosis of No Physiological Significance. E. W. Hancock, W. M. Madison Jr., M. H. Proctor and others. New England J. Med. **258**:305-312 (Feb. 13) 1958 [Boston].

Seven men, between the ages of 51 and 67 years, were admitted to hospital with severe cardiac symptoms, including acute pulmonary edema in 2, less acute forms of congestive heart failure in 4, and intractable angina pectoris in 1. All of them were thought to have aortic stenosis as an essentially isolated valvular lesion possibly remediable by aortic valve surgery. Yet the clinical picture in each was in some respects atypical. Catheterization of the left side of the heart was performed by right-sided posterior transthoracic puncture of the left atrium with the patient in the prone position and under local anesthesia; a barbiturate and meperidine were administered as premedication. The left ventricle was catheterized with a polyethylene catheter, 40 cm. in length and 0.030 in. in internal diameter. Cardiac catheterization established the correct diagnosis, i. e., coronary artery disease with myocardial infarction in 5 patients, and mitral valve disease not clearly apparent from clinical findings in 2. Cardiac catheterization thus was of great value in avoiding ill-advised surgical intervention in these patients.

Aortic stenosis and chronic coronary artery disease may cause similar clinical syndromes of cardiac disease. Thus, patients with signs and symptoms suggestive of severe aortic stenosis may, in fact, be suffering predominantly from coronary artery disease. The presence or absence of significant aortic stenosis is objectively established by the findings of catheterization of the left side of the heart. This procedure is indicated whenever surgery of aortic stenosis is under consideration and there is uncertainty about the degree of aortic stenosis present.

Lessons from Serum Cholesterol Studies in Japan, Hawaii and Los Angeles. A. Keys, N. Kimura, A. Kusukawa and others. Ann. Int. Med. **48**:83-94 (Jan.) 1958 [Lancaster, Pa.].

The authors enumerate the main points of the hypothesis about the influence of dietary fats on the development of coronary heart disease. These points are as follows: 1. In our society an endless succession of fat-loading meals is the most important etiological factor in coronary heart disease. 2. One effect of this kind of high-fat diet is hypercholesterolemia, and this is so universal that the so-called cholesterol norms are simply standards for preclinical coronary disease. Hypercholesterolemia promotes atherosclerosis. 3. Fatty meals induce changes in the coagulability and other characteristics of the blood that favor thrombosis and inhibit fibrinolysis. 4. Food fats differ in their effect on the blood cholesterol, but the fats most abundant in our [American] diet promote hypercholesterolemia.

The basic question under investigation is this: What causes the striking differences in the frequency of coronary heart disease in different populations? In an earlier report the authors presented observations of conditions in South Africa, which demonstrated that dietary fat is an important element in the remarkable differences among populations in the frequency of coronary heart disease. Now they report findings in Japan and among Japanese in Hawaii and in California. Of all countries with detailed vital statistics, Japan reports the lowest mortality rate from coronary heart disease. Coronary heart disease is fairly common among Japanese in Hawaii but very rare in Japan. Among Japanese in California it is known that coronary

heart disease is the leading cause of death. The representation of coronary heart disease among Japanese patients at the Los Angeles Japanese Hospital and those observed in private practice is much the same as among Caucasians in California.

The mean percentage of calories provided by fats in the diet and concentration of beta lipoprotein-cholesterol in the serum was studied in Japanese men, aged 40 to 49 years, in several localities in Japan, in Hawaii, and in Los Angeles. Fats provided less than 10% of total calories for the farmers at Koga and slightly more for miners and clerks in Shime; the highest fat intake in Kyushu was that of physicians, who got an average of 22% of their calories from fats. In Hawaii the Japanese men of this age group averaged a little more than 30% fat calories, and in Los Angeles the average was almost 40%. Serum cholesterol was linearly related to this percentage. The Japanese, except those in Los Angeles, get a larger proportion of their calories from fish and marine invertebrates than do the Caucasians. However, among Japanese, as in the case of most of the world's populations, when the diet is increased in fats, this increase is mainly accounted for by increasing the consumption of the more saturated types of fats, as represented by beef, pork, and dairy products. While the reported findings do not constitute proof of the hypothesis that dietary fat is a major factor in the development of coronary heart disease, the theory is consistent not only with the findings comparing Japan and the United States but also with the results of the authors' studies in north and south Italy, in South Africa, in England, in Spain, in Sweden, and, most recently, in Finland. It is consistent with the findings of other investigators in Guatemala, in Israel, in India, in Nigeria, and in West Germany. So far, all investigations on populations subsisting on low-fat diets show a low incidence of atherosclerosis and coronary heart disease and a low average level of cholesterol in the blood in comparison with populations who subsist on high-fat diets.

Chlorothiazide: An Oral Diuretic. R. I. S. Bayliss, D. Marrack, J. Pirkis and others. Lancet **1**:120-124 (Jan. 18) 1958 [London].

The authors report their initial experience with a new nonmercurial diuretic, chlorothiazide (6-chloro-7-sulfamyl-1,2,4 benzathiadiazine-1,1-dioxide). The response to chlorothiazide therapy was studied in 24 patients, of whom 17 had congestive cardiac failure and the remainder had edema from various causes. Of the patients with congestive cardiac failure, 11 had responded poorly to the administration of mersalyl. A daily dose of 2 Gm. of chlorothiazide produced good results (with clearing of the edema) in 14 patients; in 7 patients the results were less satisfactory, and in 3 they were poor. Chlorothiazide may be effective in patients who do not respond to mersalyl, and it enhances the response to mersalyl even in patients who have become mersalyl-resistant. Except for 1 patient who developed malaise and anorexia, no toxic effects were observed. Chlorothiazide may cause potassium depletion, particularly if continuous treatment with 2 Gm. daily is given over a long period. In refractory cases this dosage may be required and should be supplemented with 2 to 6 Gm. of potassium chloride (sufficient to maintain a normal serum potassium level). In less severe cases which respond quickly, a smaller dose of chlorothiazide (1 to 1.5 Gm. daily) may suffice, and for maintenance therapy the drug may be given intermittently on 3 or 4 days each week.

SURGERY

Stab Wound of the Aortic Arch. R. Perkins and T. Elchos. Ann. Surg. **147**:83-86 (Jan.) 1958 [Philadelphia].

A 16-year-old youth was brought to the emergency room of the University of Alabama Hospital. He was conscious but apprehensive and stated that 30 minutes earlier he had been stabbed in the neck with a "switch-blade" knife. He complained of shortness of breath and sharp inspiratory pain on the left side of the chest. There was a 4-cm. laceration in the suprasternal notch which showed moderate bleeding of bright red blood, controlled by bandage. Initial treatment consisted of bilateral intravenous infusions of isotonic sodium chloride solution, followed by whole blood when this became available, nasal administration of oxygen, 3,000 units of antitetanic serum, and 0.5 cc. of tetanus toxoid. During the initial evaluation and treatment the patient became more dyspneic, apprehensive, violent, and uncooperative. Respiratory stridor developed, and the blood pressure dropped to 80/0 mm. Hg.

In the operating room the left side of the patient's chest was opened in the 4th anterior interspace, and blood and some air gushed out. It was evident that a major vessel had been lacerated, with hemorrhage initially into the mediastinum, later extending into the pleural space on the left, and that collapse had resulted from exsanguination, tension hemopneumothorax, and anoxia due to tracheal compression. The heart was in standstill, and cardiac massage was begun. The transfusion rate was increased. Further exposure was gained by splitting the sternum vertically and retracting the upper part of the anterior thoracic cage on the left. The mediastinum was a mass of blood clot and hemorrhagic fat, in the depths of which could be found an area where bright red blood was spurting. Finger pressure control was possible, but some blood loss continued during attempts to

visualize the area. Initial dissection indicated laceration of the proximal innominate artery. The distal innominate artery was ligated. Some control of bleeding resulted, and it was then possible to ascertain that the laceration involved the base of the innominate artery and extended on to the aortic arch for about 1.5 cm., the total laceration being about 2 cm. long.

Complete control was secured by placement of Allis clamps as the finger was withdrawn; then a Potts clamp was applied longitudinally to exclude the laceration but not to obstruct the aorta. The laceration was repaired with continuous over-and-over everting fine silk suture. Blood clot was evacuated from the mediastinum, and the innominate veins and trachea were explored and found to be intact. Heart beat recurred spontaneously after 15 minutes, and after 30 minutes it was strong and regular. Postoperatively, the patient reacted well from anesthesia, and there was no evidence of cerebral damage. The pulse and blood pressure remained stable. A stab wound of the aorta would appear to be a more serious injury than a stab wound of the myocardium, primarily because exsanguination occurs more quickly. The authors believe that the few patients with aortic laceration who survive to reach the hospital should be salvageable by a radical surgical approach, which involves immediate thoracotomy, with control of hemorrhage, rapid replacement of blood volume, and cardiac resuscitative measures.

Colonic Replacement of Distal Esophagus and Proximal Stomach in the Management of Bleeding Varices in Children. C. E. Koop and S. R. Roddy. Ann. Surg. **147**:17-25 (Jan.) 1958 [Philadelphia].

The authors describe their experience with the use of a colon transplant to replace a resected lower esophagus and upper stomach in an attempt to control bleeding from esophageal varices when other methods have failed. Several years ago they attempted such a procedure without success in a child who was near death. Five children, ranging in age from 20 months to 16 years, have since been operated on electively after hemorrhage and subsequent to at least 1 attack of bleeding. The operation was carried out through a combined thoracicoabdominal approach, the diaphragm being cut only to within 2 to 3 cm. of the esophageal hiatus because of the varicosities in that area. A segment of transverse colon, 10 to 12 cm. in length, was then selected to the left of the middle colic artery and isolated, after which continuity of the colon was reestablished by end-to-end anastomosis. [All the patients had been prepared for operation by means of enemas and neomycin administered by mouth.] When the colon was ready for transplantation, the diaphragmatic incision was extended to the esophagus, hemostasis obtained, and the esophagus divided 3 to 5 cm. above the esophagocardiac junction. An anastomosis between the esophagus and the proximal end of the transverse colon transplant was then carried out. The gastrohepatic ligament was divided far enough to permit resection of about 5 cm. of the stomach as measured along the lesser curvature. The open end of the proximal part of the stomach was closed in layers, leaving an unsutured area at the lesser curvature (greater curvature in 1 case) for anastomosis to the distal end of the colon transplant. A nasogastric tube was passed through both anastomoses of the stomach, with holes cut in it above each suture line. The diaphragm was then reapproximated, so that the esophageal hiatus was at the level of the midpoint of the transplant. Because of the serious nature of the underlying lesion, the procedure described must be considered to be only palliative, but it would seem to be a worthwhile addition to the management of bleeding esophageal varices.

Visual Repair of Congenital Aortic Stenosis During Hypothermia. H. Swan, R. H. Wilkinson and S. G. Blount Jr. J. Thoracic Surg. **35**:139-153 (Feb.) 1958 [St. Louis].

The authors report on 8 boys and 2 girls, between the ages of 14 months and 13 years, and 1 26-year-old man with congenital obstruction to left ventricular outflow, either at the aortic valve or at subvalvular level, who were selected from 57 patients with congenital valvular or subvalvular stenosis and were operated on with the aid of general hypothermia, circulatory arrest, and open transaortic plastic revision of their stenotic lesions. Subvalvular stenosis, which was present in 3 patients, consisted of a ring or collar of firm, whitish, fibrous tissue encircling the outflow tract of the left ventricle. This ring was located from 1 to 2 cm. below the valve in each patient. The ring involved the lowest edge of the right valve cusp in 1 patient. The posteromedial attachment of these obstructing collars was across the ventricular aspect of the aortic leaflet of the mitral valve. Of great importance was the uniform participation of the valve and the valve ring in the phenomenon of poststenotic dilatation. This participation may contribute a roentgenographic contour suggesting the subvalvular location of the lesion and also permit operative exposure through the valve ring by way of the aortic incision. Valvular stenosis was present in 8 patients and was, in general, of the type 2 stenosis of the pulmonary valve. The cusps were formed, and thickened fused commissures existed. The opening in the valve in all the patients was remarkably constant, averaging about 8 mm. in diameter. In no patient was calcification present. Bicuspid valves were found in 2 of the 8 patients, and another had essentially a bicuspid valve except that the third commissure was partially formed. Incision of this

incompletely formed commissure resulted in significant postoperative regurgitation. Incision into such commissures, if they are present, should be avoided.

Recommendation for surgery depended on the clinical evidence of severe stenosis associated with left ventricular hypertrophy. Mild to severe symptoms, such as episodes of syncope, exertional dyspnea, dizzy spells, excessive perspiration, and decreased exercise tolerance, were observed in 8 of the 11 patients. Three patients died, 1 on the day of operation of acute and intractable congestive failure after removal of a subaortic lesion, 1 of tracheobronchitis on the 5th postoperative day, and 1 of hemorrhage from a pseudoaneurysm at the aortic suture line on the 27th postoperative day. The results of operation in the 8 surviving patients were encouraging but not uniformly ideal. All these patients are considered to be improved, but slight to moderate aortic insufficiency exists in 4. Open operation on the congenital obstruction of the aortic valve and subvalvular stenosis is technically feasible with the aid of hypothermia, by surface immersion, and with circulatory occlusion. The operation has definite risks and should be applied, at the present time, only to selected patients. The most consistent results, in the long run, will be achieved in those with the subvalvular type of obstruction in whom the risk of creating postoperative aortic regurgitation does not exist, and if care is taken not to injure the aortic leaflet of the mitral valve, relief of the obstruction should be quite adequate. Because of the precision required in the actual operative maneuvers for the correction of congenital aortic stenosis, open direct-vision technique is an essential component of the surgical therapy for this lesion.

Studies on Adequate Protein Nutrition in Patients After Radical Gastrectomy. A. Bucko. Deutsche Ztschr. Verdauungskr. **17**:275-281 (No. 6) 1957 (In German) [Leipzig].

After total gastrectomy there occurs an excessive loss of nitrogen in the feces, which leads to a negative nitrogen balance, and there is also generally an increased excretion of fats in the feces. To compensate for this loss, the protein intake of these patients must be increased. To ascertain the optimal intake of protein in patients who have undergone total gastrectomy, the author made nitrogen-balance studies in 14 patients (12 men and 2 women) after total gastrectomy. Gastrectomy had been performed more than 6 months previously on all the patients, and in some cases 6 years had elapsed since gastrectomy, the average period being 18 months. All the patients showed signs of impaired nutrition. They had lost from 2 to 39 kg. (4.4 to 85.8 lb.) in weight, an average of about 14 kg. (30.8 lb.). Three series of experiments were carried out. In the first experiment, the diet provided an average of 1.72 Gm. of protein per kilogram of body weight per day, and the patients were fed 5 times a day. In the second experiment, practically the same diet was given, except that the protein intake of 1.8 Gm. per kilogram of body weight was slightly higher and the patients were fed 10 times a day. In the third experiment, the protein intake was increased to 2.55 Gm. per kilogram of body weight, and these patients were fed 10 times a day. The nitrogen balance was ascertained in all these patients by studying the excretion of nitrogen in the urine and in the feces. The studies revealed that in patients with total gastrectomy the upper limit of optimal protein intake is 2.3 Gm. per kilogram of body weight. Animal protein should predominate over vegetable protein in a ratio of 3:1, because it is better utilized. However, such large quantities of protein are not well tolerated, even when the patients are fed 10 times a day; with only 5 meals daily such large quantities of protein cannot be given.

The Surgical Treatment of Stenotic or Regurgitant Lesions of the Mitral and Aortic Valves by Direct Vision Utilizing a Pump-Oxygenator. C. W. Lillehei, V. L. Gott, R. A. DeWall and R. L. Varco. J. Thoracic Surg. **35**:154-191 (Feb.) 1958 [St. Louis].

The authors report their experience at the department of surgery of the Minnesota Medical School in Minneapolis with a pump-oxygenator for the curative treatment of aortic stenosis, aortic regurgitation, mitral stenosis, and mitral regurgitation by use of total cardiopulmonary bypass and open cardiotomy. Normal body temperature was maintained during the surgical intervention to reduce the incidence of cardiac arrhythmias and to achieve maintenance of the oxygenator blood at or a degree or 2 above the patient's body temperature which effectively controls oxygen tension during oxygenation. The unilateral posterolateral thoracotomy on the right through the bed of the 4th or the 5th rib offers excellent access to the aortic or mitral valve areas, and the good exposure afforded by use of this incision has been an important factor in the successes obtained. Occasional patients with other congenital lesions in the left side of the chest may require a bilateral anterior thoracotomy.

Retrograde perfusion of the coronary sinus in combination with the pump-oxygenator to permit visualization of the aortic valve while maintaining the myocardial blood supply was utilized in 8 patients, between the ages of 7 months and 52 years, for aortic valvuloplasty. Five of these patients with aortic valvular disease survived the operative procedure and attained excellent clinical improvement after the valvuloplasty. Two of the 3 deaths occurred in children with congenital aortic stenosis. The other failure was due to the production of aortic insufficiency in a 28-year-old patient

with a severe distortion and calcification of the valve due to acquired disease. For patients with such rigid and distorted valves it is now believed to be better to relieve the stenosis by creation of a bicuspid aperture. In the other acquired lesions with less advanced destruction and a greater degree of flexibility remaining, restoration of the triangular orifice still is sought for. In all the patients operated on, the retroperfusion of the coronary sinus appeared to protect the myocardium well against anoxia. There were no instances of cardiac arrhythmia, even though a significant number of the patients had far-advanced left ventricular disease. Acetylcholine-induced asystole was used in combination with retroperfusion of the coronary sinus in 2 of the 8 patients. After commencing the perfusion of the coronary sinus, acetylcholine was injected into the retrograde catheter and provided a dry, still field while the aortic valvuloplasty was being performed. Both patients had an excellent clinical result.

Commissurotomy was performed on a 49-year-old woman with acquired calcific aortic stenosis, utilizing total cardiopulmonary bypass during only 5 minutes of complete myocardial ischemia at normal temperature. The heart continued to beat during this time, and no cardioplegic drug was used. Despite the short period of total cardiac ischemia, the method resulted in extensive myocardial necrosis, causing the patient's death 36 hours after the surgical intervention; this approach is, therefore, not recommended for aortic valve surgery. Total cardiac ischemia, even with the additional protection offered by the potassium citrate-induced asystole, proved to be a dangerous practice in hearts with advanced states of aortic valvular disease; both patients in whom this method was used died on the operating table due to the inability to restore a left ventricular beat. Acetylcholine-induced asystole with total cardiopulmonary bypass was utilized in 6 patients with aortic valvular disease and proved to be of value when the arrest interval was brief. However, a significantly greater incidence of arrhythmias occurred than when retroperfusion was used. One operative death in this group occurred in a patient in whom a more prolonged procedure was required. Current practice has been to use the acetylcholine-induced arrest in patients with congenital lesions in whom the operative repair requires less time and the myocardium generally has a greater reserve. Retrograde perfusion of the coronary sinus, combined with retrograde acetylcholine cardioplegia if needed to facilitate exposure, is the recommended procedure for all patients with advanced degrees of acquired aortic valvular disease.

A successful complete correction of primary aortic insufficiency was obtained in a 52-year-old woman with acquired calcific aortic regurgitation and stenosis, by converting the valve leaflets by suture to a bicuspid orifice and inserting a prosthetic replacement to make up for any shrinkage or loss of tissue substance. Surgical repair of pure mitral insufficiency utilizing the pump-oxygenator was performed on 5 patients between the ages of 15 and 43 years; 4 of these were subjected to an annuloplasty consisting, in part, of selective suturing of the annulus fibrosus under direct vision to reduce its circumference commensurate with the area of valvular tissue present. Insertion of a prosthetic valve leaflet was performed in the 5th patient with substantial loss of leaflet substance. Before the surgical intervention all the patients had been seriously incapacitated by severe mitral regurgitation. There has been no operative or late death. All the patients are alive and are significantly improved. The first patient, who has been followed postoperatively for more than 1 year, has not only sustained his initial gains but has continued to improve. Surgical correction of mitral insufficiency is feasible, effective, and lifesaving. Five additional patients with pure mitral stenosis associated with other complicating factors or lesions had mitral commissurotomies under direct vision during total cardiopulmonary bypass utilizing the pump-oxygenator. There was 1 operative death. The 4 survivors have been benefited significantly.

The Clinical and Physiologic Criteria for Surgical Correction of Mitral Insufficiency. J. C. Davila, R. P. Glover, P. Jumbala and others. J. Thoracic Surg. 35:206-231 (Feb.) 1958 [St. Louis].

The authors report on 7 male and 42 female patients, between the ages of 7 and 58 years, with mitral insufficiency. All 49 patients were on a medical regimen for congestive failure. The regimen consisted of administration of digitalis preparations and mercurial diuretics, provision of a low-sodium diet, and marked restriction of activity for periods averaging 7.8 years. Twenty-six patients were medically intractable, and 23 responded to medical management. Circumferential suture of the mitral valve was used to correct mitral insufficiency in 43 of the 49 patients. Nineteen patients were alive after the operation, 14 died 1 to 8 months after the operation, and 10 died within the first postoperative week. An analysis of objective and clinical findings preoperatively, at surgical intervention, and postoperatively and an analysis of the results of corrective surgery warrant the following conclusions. Pure or predominant mitral insufficiency can be corrected mechanically, provided that mobility and flexibility of the valvular area are retained. Despite satisfactory correction of the regurgitant lesion, lasting benefit cannot be expected in patients in whom myocardial contractility is destroyed by compensatory overdilatation. When valvular damage is excessive and myocardial exhaustion has supervened, surgical inter-

vention can be of no value. If surgical treatment is to be successful in the advanced stages of the disease, means must be sought to improve myocardial function. Ligation of the vena cava below the renal veins may be of some value in this regard. Proper selection of patients should make possible the reduction of operative mortality, should eliminate late deaths, and should lead to the attainment of consistent and highly satisfactory results. Current methods of preoperative study, both clinical and objective, are inadequate to evaluate the state of the myocardium. The size of the heart as determined by x-ray examination, the degree of pulmonary hypertension, and the left ventricular end-diastolic pressure are the only parameters which correlate in any manner with the results of surgery. The clinical and operative findings, particularly the latter, are currently the most useful guide to prognosis.

Coarctation of the Abdominal Aorta: A Case Successfully Treated Surgically. F. S. Gerbasi, R. S. Kibler and A. M. Margileth. J. Pediat. **52**:191-198 (Feb.) 1958 [St. Louis].

The authors report on an 11-year-old girl who since the age of 7 years had had frontal headaches which occurred about 3 or 4 times each year and which were associated with nervousness and occasional nausea. A heart murmur was noted by the family physician. A blood pressure of 180/120 mm. Hg in both arms, diminished femoral pulsations, and inability to obtain a blood pressure in either leg was revealed on examination by the cardiologist. A systolic murmur, grade 3 in intensity, was heard along the sternal border on the left and also in the posterior part of the chest on the left. A chest roentgenogram revealed rounding of the left ventricular shadow suggestive of early hypertrophy. The aortic knob was prominent. The electrocardiogram revealed depression of the S-T segment in leads V_5 and V_6. The corrected Q-T interval was 0.26. A diagnosis of coarctation of the aorta was made.

The patient was given a general anesthetic, and a left parascapular incision was made. The 4th interspace was entered, but no definite coarctation of the aorta could be seen. On palpation of the lower thoracic aorta, a thrill was felt at the aortic hiatus of the diaphragm, and it was noted that the intercostal vessels in the lower thorax were much larger than those visualized above. An oblique extension of the previous incision was made and was carried down over the 8th interspace. The lower portion of the thoracic aorta and the upper portion of the abdominal aorta were exposed. About 2 cm. caudal to the aortic hiatus the aorta became almost solid. The procedure was terminated, the patient made a rapid recovery, and 9 days later a retrograde aortogram was performed which showed a coarctation, approximately 3 cm. in length, extending from the first lumbar vertebra to about 2 to 3 cm. above the origins of the renal arteries. Considerable collateral circulation was noted between the lower intercostal and the lumbar arteries. Three weeks after the first operation the patient was reoperated on. An incision was made through the 9th intercostal space and was carried down over the anterior abdominal wall to a level 3 cm. below the umbilicus. The abdominal aorta was exposed retroperitoneally. The narrowing of the aorta was above the renal arteries and involved the celiac axis. Because of its unusual location the entire defect was bypassed, and an aortic homograft was used successfully as a shunt about the constricted area. If a replacement graft had been inserted, it would have been most difficult to anastomose the branches of the celiac axis to the graft, since these vessels were of such small caliber that the likelihood of such anastomoses remaining patent would have been small. The patient tolerated the procedure well, and the postoperative course was relatively uneventful. The blood pressure varied between 112 and 170 mm. Hg systolic and between 80 and 120 mm. Hg diastolic. Nine months after the second operation the patient was well and had been on full activity during the previous 2 months. The cardiac murmur was absent. The blood pressure was 110/70 mm. Hg in the arms, 120/80 mm. Hg in the left leg, and 95/75 mm. Hg in the right leg. Surgical correction of such lesions is the only satisfactory method of treatment.

Leiomyosarcoma of the Lung. H. Yacoubian, J. E. Connolly and R. H. Wylie. Ann. Surg. **147**:116-123 (Jan.) 1958 [Philadelphia].

Leiomyosarcomas of the lung are rare. A review of the literature has revealed 12 cases, 6 of the patients being treated successfully by resection. The case presented here is the 13th case on record and the 7th in which the patient was treated successfully by operation. The patient was a 29-year-old woman who was admitted to the Bellevue Hospital chest service with a 1-week history of headache, fever, chills, and cough productive of increasing amounts of thick yellow purulent sputum. Four days prior to admission a right-sided pleuritic chest pain developed, and the patient had bright red hemoptysis. A chest film revealed diffuse haziness on the right side below the 7th rib posteriorly, radiating from the hilus and obscuring the base and costophrenic angle. In response to treatment with penicillin and Aureomycin, the fever subsided. However, although a chest film showed clearing at the base, an ill-defined shadow persisted in the region of the hilus of the right lung. On lateral chest films this shadow was seen to be located in the region of the superior segment of the lower lobe of the right lung. Bronchoscopy revealed a smooth, pink, poly-

poid mass measuring 1 by 1 cm., growing out of the superior segmental orifice of the lower lobe of the right lung. It was friable and bled excessively when a specimen was removed for biopsy. The biopsy report was leiomyosarcoma. Because of the proximity of this tumor mass to the upper lobe bronchus, it was elected to perform a pneumonectomy. A concomitant 4-rib thoracoplasty was done. The patient's postoperative convalescence was uneventful. Microscopic sections revealed a leiomyosarcoma. The lymph nodes in the specimen were not involved. The patient has remained well and has been free of disease 1 year after resection.

The 12 cases of leiomyosarcoma of the lung previously reported are briefly reviewed. These tumors are usually centrally located, arising in the major bronchi. In 8 of the 13 cases the tumor was accessible by bronchoscopy and arose in a main stem bronchus or in 1 of its major branches. Leiomyosarcomas seem to grow slowly and extend locally by direct continuity. They are not, however, as invasive locally as carcinomas. They metastasize late by hematogenous dissemination. Bronchoscopic biopsy should establish the diagnosis. The symptoms are primarily respiratory. Hemoptysis is more common than in carcinoma of the lung. The cure rate after resection in cases of leiomyosarcoma should be high compared with carcinoma of the lung. Exploratory thoracotomy should be done in all cases where there are no demonstrable metastases.

The Management of Perforative Carcinoma of the Colon. G. A. Donaldson. New England J. Med. **258:**201-207 (Jan. 30) 1958 [Boston].

The 182 patients reviewed comprised 7.8% of all patients with carcinoma of the colon treated at the Massachusetts General Hospital over a 20-year period. Three types of perforations are differentiated: (1) free rupture into the peritoneal cavity; (2) local abscess formation; and (3) formation of a fistula to a hollow viscus. Largely because of the ulcerating, inflammatory nature of all these lesions, the area of disease tends to become walled off before perforation occurs. In this group 93 (51%) of the patients had a local abscess; 50 (28%) had fistula formation; and 39 (21%) had free perforation. Sixty-six per cent, or 121 patients, came to resection, and 84 of them were operated on more than 5 years ago. Resectability is influenced largely by the ability to survive a preliminary drainage or bypass operation. Operative mortality is high and is related to the type of perforation and the operative procedure performed.

This opinion is supported by the deaths among the 121 patients undergoing removal of the tumor either as a primary or as a secondary procedure. Here 12 deaths, representing a mortality of 10%, occurred at the time of the primary or definitive surgery. In the more critically ill, drainage and exteriorization were done, with a mortality of 25 and 38% respectively. Nine per cent of 68 patients subjected to a bypassing procedure and later to a resection succumbed to one of these operations, whereas only 5% of 41 patients died as a result of a primary removal of the tumor. Twenty-eight of 73 patients surviving resection are alive 5 years or more after surgery. The fistula group contributed 14, or 50%, of the 28 patients who survived for 5 years. Lesions in the transverse colon presented the highest salvage rate, namely, 60%. The type of primary operation chosen and the involvement of regional lymph nodes also have a bearing on 5-year salvage. The author makes suggestions on the preferred method of management of the various types of perforations in the various areas of the large intestine.

Clinical Contribution to Resection Therapy of Pulmonary Tuberculosis. H.-A. Korn. Ztschr. Tuberk. **110:**133-143 (No. 3 and 4) 1957 (In German) [Leipzig].

This report is concerned with observations on 100 pulmonary resections carried out on patients with tuberculosis in the course of 2 years. Repeated resections and exploratory or repeated thoracotomies are not included in this number. Twelve of the 100 patients had bronchostenosis and atelectasis with large and inflated cavities, pulmonary destruction, and residual empyema cavities; 53 patients had caseous foci with filled cavities, caseous foci with breakdown into small cavities and surrounding tuberculous dissemination, and caseous pneumonic tuberculosis; 14 had tuberculomas (round foci of stratified structure); 4 had tuberculosis and bronchiectasis (post-tuberculosis syndrome); and 17 patients were subjected to resection after collapse therapy had failed, and the remaining cavities had either proved resistant to treatment or cavitation had recurred. The 100 patients included 56 women and 44 men, whose ages ranged from 13 to 51 years. In 74 of the patients the sputum contained tubercle bacilli before the operation, whereas in the remaining 26 patients the sputum was free from tubercle bacilli, but in 12 of this last group a smear from the surgical specimen yielded tubercle bacilli. In 59 of the patients the tuberculosis had been in existence for less than a year, but 17 of the patients had had tuberculosis for 5 years or more.

The extent of the resection varied; 8 patients were subjected to pneumonectomy, 57 to lobectomy, and 34 to segmental resection, and in 1 patient a wedge excision was carried out. All resections were carried out under cover of streptomycin therapy. Treatment with streptomycin was generally begun from 8 to 14 days before the operation, and it was continued after the operation, generally until an average dose of 30 Gm. had been administered. Only 1 patient

died as the result of pulmonary resection 6 hours after operation; death seemed to be due to hypoxemia after pneumonectomy on the right side with a contralateral pneumothorax. Three patients had granulomas of the bronchial stump, and in 1 of these tubercle bacilli again appeared in the sputum. Two patients had recurrences in the form of early reactions; in 1 patient the recurrence took the form of a contralateral recurrence and in the other of a homolateral reactivation. Complications, such as bronchial fistulas, pleural empyema, or pulmonary embolism, were not observed in any of the patients. Proper selection of patients for pulmonary resection greatly increases the prospects of success. Patients should be prepared by a rest cure in a sanitarium, and then the most suitable time for the operation can be ascertained. Consistent postoperative therapy is also of great importance.

Heterotopic Pancreatic Tissue Involving the Stomach. N. S. Martinez, C. G. Morlock, M. B. Dockerty and others. Ann. Surg. **147**:1-12 (Jan.) 1958 [Philadelphia].

A review of the literature has disclosed reports of 154 surgical cases of heterotopic pancreatic tissue involving the stomach. This report summarizes the data in 51 cases observed at the Mayo Clinic; 41 of these cases were previously unreported, thus bringing the total to 195. Heterotopic pancreatic tissue is found in patients of all age groups but most commonly in those in the 4th and 5th decades of life. The incidence is slightly greater in male than in female patients. In this series the heterotopic pancreatic tissue was purely an incidental finding in only 16 of the 51 patients; in all others the lesions were associated with clinical signs or roentgenologic manifestations or both. The condition does not have a specific symptom complex. Pyloric obstruction is sometimes produced by intermittent prolapse of the lesion through the pylorus or by proliferation of the surrounding muscle. Severe gastrointestinal bleeding occasionally occurs because of ulceration of the overlying gastric mucosa.

About three-fourths of the patients in this series showed roentgenologic changes, which were most frequently consistent with a polypoid gastric tumor. The roentgenologic demonstration of barium-filled excretory ducts, seen head on or in profile, contained within the boundaries of a small (less than 1.5 cm.) filling defect located in the antrum, justifies the diagnosis of heterotopic pancreatic tissue. The morphologic characteristics of these lesions vary with the gastric layers predominantly involved. Submucosal heterotopic masses of pancreatic tissue frequently present a nipple-like umbilicated appearance. Most lesions occur within 5 cm. of the pylorus; they are susceptible to the usual pathological changes, such as myomatous proliferation, ulceration, neoplastic changes, pancreatitis, and formation of cysts. The clinical course is usually benign, but the presence of symptoms and the roentgenologic demonstration of a lesion justify surgical excision. When the lesion is found incidentally, its removal is indicated to obtain histological confirmation of its character and to obviate development of clinical manifestations or pathological changes. The slight risk of operations in the present era justifies excision of all heterotopic masses of pancreatic tissue involving the stomach. Local excision is the most suitable operation, and subtotal gastric resection is best reserved for patients in whom the true nature of the lesion cannot be established and malignancy is suspected.

Clinicopathological Study of 94 Limbs Amputated for Occlusive Vascular Disease. P. J. Kelly, D. C. Dahlin and J. M. Janes. J. Bone & Joint Surg. **40 A:** 72-78 (Jan.) 1958 [Boston].

A clinical study of 323 amputations with reference to all factors that determine the site of amputation in occlusive vascular disease included this anatomicopathological study of 94 amputated lower limbs. The amputations were performed at the Mayo Clinic between March, 1949, and April, 1951. Forty of the limbs were amputated through the thigh and 54 below the knee. These 94 extremities were dissected, and the vascular pathological changes were recorded on a sketch of the main arteries of the limb. The vessels studied included the anterior tibial, posterior tibial, and peroneal arteries, as well as the distal portions of the femoral and popliteal arteries when they were available. The vessels were carefully examined grossly by making cross sections every few millimeters. Multiple fresh frozen sections were prepared and examined microscopically. After representative sections were selected in this manner, fixed sections were made and stained with hematoxylin and eosin and with an elastic-tissue stain counterstained with van Gieson's solution. The clinical data on all the patients who had such amputations were available.

Dissection and miscroscopic examination of the 40 limbs amputated above the knee demonstrated the segmental nature of the occlusive arterial lesions in atherosclerosis obliterans. Limbs amputated above the knee that contained fresh thrombi in the femoral or popliteal arteries were clinically the most ischemic of the entire series of 94 limbs examined. Patients with diabetes mellitus who were subjected to amputation above the knee did not have fresh thrombi in the popliteal or femoral arteries. This correlates with the clinical finding that recent sudden arterial occlusion is relatively infrequent as the initiating factor for amputation in patients with both atherosclerosis and diabetes. The anterior tibial, posterior tibial, and peroneal arteries of limbs amputated for atherosclerosis obliterans

showed no quantitative differences in the degree of occlusion in those amputated above the knee compared with those amputated below the knee. The old lesions of thromboangiitis obliterans may bear a strong histological resemblance to certain other thrombotic lesions, such as those secondary to emboli. The microscopic picture of thromboangiitis obliterans is not always specific, and its diagnosis requires that the pathologist be familiar with the clinical history and findings in all cases.

Fusion of the Spine for Tuberculosis in Children: A Long-Range Follow-up Study. M. Cleveland, D. M. Bosworth, J. W. Fielding and P. Smyrnis. J. Bone & Joint Surg. **40 A**:91-106 (Jan.) 1958 [Boston].

The observations presented were made on 18 of 42 children, who were treated by spine fusion for tuberculosis between 1929 and 1941. None of these patients received antituberculous medication, since the period of treatment was before its discovery. Sixteen of the 18 were in poor general condition; the average age at the time of operation was 5½ years, the youngest being 1.9 years old and the oldest 12 years of age. As regards ethnic groups, there was no essential difference between one and another in recovery, given equal surgical, medical, dietary, and general physical care. Two boys died of meningitis. One of them had tuberculosis of the spine, hip, and shoulder. Both hip and shoulder were successfully fused. A solid spine fusion of adequate length was obtained. This patient disappeared from observation while in excellent condition. The authors heard of his death several years later. The other boy had extensive tuberculosis of the cervicothoracic spine with destruction from the 5th cervical to the 7th thoracic vertebra, inclusive. Fusion was done in 2 stages. Further extension of fusion was advised, but the patient was removed by his parents. He returned with paraplegia and sinuses from the spinal area and died. The 16 who survived now range in age from 18 to 36 years. Nine of them are essentially normal as judged by physical activity. Four are in excellent condition, but because of moderate kyphosis, apparent when unclothed, they cannot be considered normal. Two have considerable kyphosis which is apparent even when the patient is clothed. One has marked deformity, with great constriction of the chest and loss of abdominal as well as thoracic space. All the patients with primary lumbar involvement had excellent results.

Four of the girls married, and 2 of them have children. Two of the men are married, and both are fathers. All the children are alive and well. Social adjustments are excellent in 10 patients, good in 3, moderately limited in 2, and considerably limited in 1. The following points are stressed in the concluding summary: 1. Spine-fusion masses grow and of themselves cause minimal deformity. 2. Spine fusion can decrease or may prevent collapse of diseased vertebral bodies in a child with tuberculous spondylitis. 3. No residual pelvic effects were noted in adults as a result of removal of iliac grafts from them as children. 4. Development of kyphosis may at times be the result of fatigue-stress fracture of the fusion mass with spontaneous repair occurring unnoted. 5. Paraplegia in a child, due to vertebral tuberculosis, demands spine fusion, not laminectomy or evacuation of abscess. 6. Tuberculosis of the spine in a child adequately treated by spine fusion can result in an excellent physical status in the adult.

GYNECOLOGY & OBSTETRICS

Arias-Stella Reaction as Diagnostic Aid in Extrauterine Pregnancy. T. Frederiksen. Ugesk. læger **120**:51-55 (Jan. 9) 1958 (In Danish) [Copenhagen].

In 32 patients with extrauterine pregnancy who underwent operation, scrapings from preliminary curettage of the uterus were examined histologically. Special search was made for the endometrial changes described by Arias-Stella, said to occur when there is chorion tissue somewhere in the organism. The changes are shown by the occurrence, especially focally, of glands in which some of the nuclei become large, hyperchromatic, and irregular in form. The nuclei also lose their polarity and are displaced luminally in the cells. The changes were found in 13 of the scrapings. In 6 cases there was not simultaneous decidual reaction. The number of cases in which extrauterine pregnancy could be suspected increased from 38 to 56%.

Stress Incontinence of Urine in the Female and Sling Operation. V. Hiilesmaa. Ann. chir. et gynaec. Fenniae **46**:384-397 (No. 4) 1957 (In English) [Helsinki].

Seventy-three women, between the ages of 25 and 68 years, most of them parous, with stress incontinence of urine underwent a sling operation at the women's clinic of the University of Helsinki between January, 1951, and June, 1956. A flap of fascia, freed from the aponeurosis of the muscles in the abdominal wall, was utilized to form a sling which, in the fashion of a hooked finger, elevated the urethral base and the bladder neck. A combined abdominovaginal technique was used in 64 patients and a purely abdominal technique in 9. The plastic repair was done according to the Goebell-Frangenheim-Stoeckel method in 53 of the 64 patients; Aldridge's method was employed in 9 patients and Sunde's method in 2. For the purely abdominal operations the technique described by Sjövall was employed. Nineteen of the 73 patients had been operated on previously and had recurrences of stress incontinence. Prolapse of the uterus had occurred in 28 patients who had moderately

severe or severe incontinence. Of the 73 patients, 2 had mild incontinence, 42 had moderately severe incontinence, and 29 had severe incontinence. Preoperative urethrocystography was performed in 17 patients and revealed abnormal widening of the urethrovesical angle varying from 150 to 180 degrees.

Obstetric trauma is the principal cause of stress incontinence in women. Operative procedures in connection with delivery were frequent (3 forceps deliveries and 9 breech deliveries with manual aid). The incontinence had started immediately after delivery in 24 patients, 3 of whom were delivered by forceps and 1 had a breech delivery with manual aid. Only 7 patients had had 5 or more deliveries, but severe incontinence was about equally frequent in women with 1, 2, or 3 children. These data suggest that the number of deliveries as such does not increase the incidence or the severity of stress incontinence, but the importance of each delivery must be evaluated in the individual patient.

Bladder lesions occurred in connection with the operation in 6 patients and a urethral lesion in 1; 5 of these patients had an abdominal operation and 2 an abdominovaginal operation. Because of the lower incidence of complications, the abdominovaginal method may be considered more favorable. There were no deaths. Sixty-nine patients were followed up postoperatively from 6 months to 5 years. Forty-six patients obtained a complete cure, 17 were improved, and 6 (about 9%) were failures.

Some Clinical Applications of Vaginal Smears in Gynaecological Endocrinology. F. Osmond-Clarke and M. Murray. Brit. M. J. 1:307-310 (Feb. 8) 1958 [London].

Periodic or daily vaginal smears were obtained from 110 patients attending the endocrine clinic of the Chelsea Hospital for Women in London, and single vaginal smears were obtained from 40 patients attending the cancer follow-up clinic of the same hospital. The vaginal smears were obtained by aspirating the secretion from the posterior fornix of the vagina. The single differential stain now used in Shorr's clinic in New York City was applied to the vaginal smears and gave satisfactory results by providing information concerning hormone activity. Like all present methods of observing ovarian function, vaginal cytology has its limitations, but it has the advantages of being simple, inexpensive, and nontraumatic and does not require the patient's admission to hospital or the use of laboratory animals. Furthermore, it permits a continuous rather than an isolated study of ovarian function. The daily percentages of each type of cell found in the vaginal smears were plotted graphically to record the functional state of the ovaries. The curve shown by the cornified cells, whose percentage varies in proportion to the amount of estrogen being utilized in the body, proved to be the most indicative of ovarian activity. Conversely, the percentage of basal cells varied with the degree of atrophy of the vaginal epithelium.

Clinically, vaginal cytology has been of value in amenorrhea to assess the degree and character of ovarian dysfunction, in the management of the menopause, and in infertility. It has also been useful as a therapeutic index for patients with ovarian agenesis treated by implantation of estrogen, for pregnant women with a history of frequent miscarriages treated by implantation of progesterone, for patients given androgen therapy to counteract the effect of excessive estrogen, and for patients given small doses of deep x-ray therapy to stimulate ovarian activity. Vaginal cytology has been of aid in detecting the presence or absence of estrogens in patients with uterine carcinoma.

PEDIATRICS

Marchesani Syndrome. J. Zabriskie and M. Reisman. J. Pediat. 52:158-169 (Feb.) 1958 [St. Louis].

The authors report on 2 siblings, a 9-year-old boy and his 6-year-old brother, with the syndrome first described by Marchesani in 1939, which consists of short stature, brachydactylia, and spherophakia, with associated myopia and glaucoma. Fourteen cases of Marchesani's syndrome in children between the ages of 9 months and 13 years, including the 4 original cases of Marchesani, have been collected from the literature. The authors' 2 patients represent the only offspring of 2 short parents who were first cousins; a maternal grandmother was short, wore glasses all her life, and had cataract extractions late in life. One of the 2 patients had evidence of infundibular pulmonary stenosis, while the other had a probable interventricular septal defect. Only 1 of the 14 previously reported patients had a cardiac murmur. There seems to be general agreement that the Marchesani syndrome represents an hereditary defect. The appearance of incomplete syndromes (forme fruste), either spherophakia with normal extremities or brachydactylia with normal eyes, suggests that mild brachydactylia represents a heterozygous intermediate, while severe spherophakia (with or without brachydactylia) represents the homozygous recessive form. The occurrence of consanguinity in several of the families reported further favors a homozygous recessive genotype.

Marchesani and later Schmid commented on the striking contrast of their cases with those of Marfan. The patient with Marfan's syndrome is tall, tending to kyphosis and scoliosis of the spine. The extremities are long with "spider fingers" (arachnodactyly). Congenital ectopia lentis and congenital cardiac and vascular defects are often present. The Marchesani syndrome and the Marfan syndrome are at opposite poles in many systemic respects,

but they share similar lens defects. Marchesani postulated that there was a single defect (dystrophia mesodermalis congenita), the 2 syndromes representing the hypoplastic (arachnodactylic) and the hyperplastic (brachydactylic) variants. If Marfan's syndrome is a hypoplastic mesodermal defect, then the result of a defect in the cardiac elastic tissues would result in lesions of a "dilating" nature, i. e., insufficiency and aneurysm. In a series of 28 patients with Marfan's syndrome who died and on whom autopsies were performed, 11 had aortic cystic necrosis, 15 had aortic aneurysms, and 10 had aortic insufficiency. If one further postulated the converse for the Marchesani or hyperplastic syndrome, one would expect cardiac lesions of a stenotic nature. The pulmonary stenosis in 1 of the authors' patients is compatible with this somewhat tenuous hypothesis.

Endocardial Fibroelastosis: Angiocardiographic Studies. L. M. Linde, F. H. Adams and B. J. O'Loughlin. Circulation **17**:40-45 (Jan.) 1958 [New York].

The authors report on 4 children, 2 boys and 2 girls, between the ages of 3½ months and 2 years, in whom the chronic form of primary endocardial fibroelastosis was diagnosed clinically and confirmed by autopsy in 1. Selective biplane angiocardiography, in which a 50% solution of sodium diprotrizoate (Miokon) was used as contrast medium, was performed in all patients. A striking finding was the unchanging size and contour of the left ventricle in consecutive cardiac cycles. Angiocardiographic studies performed in patients with left ventricular enlargement and left ventricular failure without endocardial fibroelastosis showed marked systolic and diastolic change in volume in the left ventricle and the left atrium. These observations indicate that the unchanging size and contour of the left ventricle in the patients with endocardial fibroelastosis were not due to heart failure or left ventricular hypertrophy. All angiographic studies in the latter patients showed prolonged retention of dye in an enlarged left ventricle, as muscular contraction was apparently impaired by a splinting action of the thickened endocardium. These findings may help in understanding the pathological physiology in endocardial fibroelastosis and may be of aid in the antemortem diagnosis of this entity.

Newly Recognized Myxoviruses from Children with Respiratory Disease. R. M. Chanock, R. H. Parrott, K. Cook and others. New England J. Med. **258**:207-213 (Jan. 30) 1958 [Boston].

The studies described were designed to investigate the viral etiology of respiratory illness in infants and young children. Monkey kidney tissue cultures maintained in Eagle's basal medium were inoculated with 0.2 ml. of throat-swab fluid and incubated for 5 days at 37 C. Then, 0.2 ml. of a 0.4% guinea pig erythrocyte suspension was added, and cultures were placed at 4 C for 20 minutes. The cultures were then examined microscopically for adsorption of red cells to the monkey kidney monolayer. If adsorption (hereafter called hemadsorption) occurred, the tissue culture fluid was passed into a series of cultures for identification. The cultures that did not show hemadsorption at 5 days were fed with fresh maintenance medium and tested again at 5-day intervals for an additional 20 days. The phenomenon of hemadsorption was first described by Bogel and Shelokov.

Two new myxoviruses were isolated from children with respiratory illness by means of the hemadsorption technique and money kidney tissue culture. Type 1 hemadsorption virus was recovered from 35 children; 8 of the children were studied in hospitals, and 27 were involved in an outbreak of febrile respiratory illness in a nursery. In a single day's test of all children in the nursery, type 1 hemadsorption virus was significantly more prevalent among children who were ill, thus suggesting an etiological relation. Type 2 hemadsorption virus was recovered from 3 children hospitalized with croup. The hemadsorption viruses were distinct from types A, B, and C of the influenza virus and from other known myxoviruses. Type 2 hemadsorption virus shared a common complement-fixing antigen with Sendai virus but could not be distinguished from it by the hemagglutination-inhibition and neutralization techniques.

THERAPEUTICS

Iatrogenic Adrenal Insufficiency. A. Vermeulen and K. Vuylsteek. Belg. tijdschr. geneesk. **13**:1367-1373 (Dec. 15) 1957 (In Flemish) [Leuven, Belgium].

Surgeons, realizing that treatment with corticoids generally retards cicatrization, have discontinued the administration of corticoids several days before a surgical intervention; they believe that a few injections of corticotropin will protect the patients against adrenocortical insufficiency and postoperative collapse. The seriousness of adrenocortical insufficiency that may result after treatment with corticoids is still not sufficiently appreciated. On the basis of a case history and of experimental clinical studies, the authors emphasize the following points: 1. Probably two-thirds of the patients who have been treated with prednisone or prednisolone have insufficiency of the adrenal cortex. 2. No clinical signs indicate the presence of this insufficiency, and particularly the sodium and potassium values may be completely normal. Only a functional test of the adrenal cortex will reveal

the insufficiency in that there is an inadequate increase in secretion of corticoids after stimulation with corticotropin. A normal basal excretion of corticoids does not exclude the presence of a functional insufficiency, and a positive Thorn test likewise is not necessarily significant. 3. The duration and dosage of treatment with corticoids are only of secondary importance. While functional insufficiency is more likely to occur after prolonged treatment with large doses of corticoids, it has also been observed after prednisone has been given for only a week in daily doses of 20 mg. 4. The severity of the insufficiency shows great individual variations. 5. This form of latent insufficiency may persist for months or even years. 6. The adrenal cortex can be reactivated by prolonged stimulation with corticotropin.

Adrenal insufficiency should always be thought of in patients who have been treated with corticoids in the last 2 years and whenever there is a postoperative shock not explainable by other factors. Treatment with corticoids should not be interrupted before an operation; on the contrary, immediately before, during, and after the operation the dose should be increased. Reduced cicatrization is a disadvantage which certainly does not justify the extreme danger of acute adrenal insufficiency. In patients in whom latent adrenal insufficiency is suspected, one should give during an operation and also during acute infection not only corticotropin but also large doses of corticoids; antibiotics should likewise be given. To interrupt a course of corticoid therapy for 1 day during the week and administer corticotropin is of no value in the prevention of adrenal insufficiencies, and corticotropin stimulation is generally of too short a duration to have any effect. Every course of corticoid therapy should be terminated with a prolonged course of corticotropin, and administration of corticotropin should begin during the last several days of treatment with corticoids. Experimental studies have indicated that slow-acting corticotropin should be given for at least 7 days.

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Nitroglycerin and Other Nitrites in the Treatment of Angina Pectoris: Comparison of Six Preparations and Four Routes of Administration. J. E. F. Riseman, G. F. Altman and S. Koretsky. Circulation **17**:22-39 (Jan.) 1958 [New York].

The comparative therapeutic value of 6 different nitrites, namely, glyceryl trinitrate (nitroglycerin), erythrol tetranitrate, mannitol hexanitrate, pentaerythritol tetranitrate, triethanolamine trinitrate biphosphate, and sodium nitrite, when administered by the oral, sublingual, subcutaneous, and percutaneous routes, was studied in 20 men and 14 women with angina pectoris due to coronary artery disease, most of whom were 51 years of age or over. This was done by measuring the amount of work that could be performed by the patients under standardized conditions without inducing anginal pain and also by observing the clinical response and the exercise electrocardiogram.

Glyceryl trinitrate, erythrol tetranitrate, mannitol hexanitrate, and triethanolamine trinitrate biphosphate were all much more effective sublingually than when swallowed. Glyceryl trinitrate and erythrol tetranitrate when administered sublingually are among the most effective of all prophylactic agents available for the treatment of patients with angina pectoris. The comparatively prolonged duration of action of erythrol tetranitrate, when given sublingually in doses of 30 mg. 3 times daily for at least 1 week, makes it especially valuable for clinical use. Glyceryl trinitrate and erythrol tetranitrate were also effective when administered parenterally or by inunction, but their value was markedly limited when swallowed. This suggests that these nitrites are inactivated in the gastrointestinal tract.

Mannitol hexanitrate also was more effective sublingually than when swallowed but was of limited clinical value because of the large size of the tablets available. Triethanolamine trinitrate was moderately effective when administered sublingually but was of no demonstrable value when swallowed. Sublingual therapy with this drug is limited because of the frequent glossitis that follows its use. Pentaerythritol tetranitrate showed little difference in the frequency of response when administered sublingually or when swallowed, but the increase in exercise tolerance was somewhat greater after sublingual administration. This drug was only of moderate value in the treatment of patients with angina pectoris. Sodium nitrite was more effective when given subcutaneously than when given sublingually or when swallowed, but the degree of value was low and the frequency of untoward reactions was too high to indicate clinical value.

Treatment of Ascariasis with Various Salts of Piperazine. L. G. Goodwin and O. D. Standen. Brit. M. J. **1**:131-133 (Jan. 18) 1958 [London].

The authors report on 770 patients, most of them schoolchildren, with ascariasis, who were treated with piperazine preparations given as a single large oral dose in 2 successive trials carried out in Gambia, Africa. In the course of the first trial in 1955, 386 patients were given a 3-Gm. dose and an additional 56 were given a 4-Gm. dose equivalent of piperazine hexahydrate. The piperazine salts employed were the citrate, adipate, phosphate, sebacate, and stearate. Except for the bulky insoluble stearate which was mixed with water and given as a draft, all the salts were given in tablet form. A dose equivalent to 3 Gm. of piperazine hexahydrate gave clearance in 293 (76%) of the 386 patients, and a dose equivalent to 4 Gm. of piperazine hexahydrate gave clearance in 25 (89%) of the 28 pa-

tients treated with piperazine phosphate and in 23 (82%) of the 28 patients treated with piperazine adipate. Piperazine sebacate and piperazine stearate gave clearance in 98 (86%) of the 114 patients treated with either one of these 2 salts in a 3-Gm. dose equivalent of piperazine hexahydrate, but they were impracticable in use on grounds of taste or bulk. It was established that the efficiency of piperazine preparations is directly related to the content of the base and is little influenced by the nature of the salt.

In the course of the second trial in 1956, 328 patients with ascariasis were treated with piperazine citrate syrup or solid piperazine citrate in tablet form. The large dose of 4 Gm. of piperazine was given to all patients in order to obtain a maximal clearance rate from a single treatment. Seventy-six (84%) of the 91 patients who received the solid preparation were cleared, and 38 (86%) of 44, 87 (88%) of 99, and 82 (87%) of 94 patients were cleared, respectively, with piperazine citrate syrup when the syrup was used after storage for 6 months at 50 C (122 F), at 37 C (98.6 F), or fresh. Piperazine citrate syrup thus was found to be stable at elevated temperatures, to be as effective as solid citrate, adipate, or phosphate, and to be of more practical value than tablet preparations in mass treatment on grounds of rapidity of dosage, rigidity of control, and palatability. No toxic side-effects were observed after a single dose of 4 Gm. of piperazine.

Piperazine and Male Fern in Expulsion of Tapeworms. L. G. Goodwin and O. D. Standen. Brit. M. J. 1:133-134 (Jan. 18) 1958 [London].

A group of native patients in the Shirati area of Tanganyika, Africa, harboring Taenia saginata (the common tapeworm of man), were treated with piperazine and extract of male fern. They were given a dose of piperazine citrate (equivalent to 3 Gm. of piperazine hexahydrate), and the next morning on an empty stomach they received 5.3 cc. of extract of male fern shaken with milk, followed 2 hours later by 2 oz. (60 Gm.) of magnesium sulfate dissolved in water. A second group of patients who served as controls were treated with extract of male fern and purge alone. Tapeworm heads were found in the stools of a larger number of patients treated with piperazine and extract of male fern than in those of patients treated with male fern alone, but the difference was not statistically significant. Piperazine used alone caused some large segments of worm to be expelled, but it did not cause the scolex to relinquish its hold of the mucosa. More than 1 tapeworm was often found in the same host. Two patients had 5 worms each, but the average for the entire group was 2. A systematic method of examining stools was used, in which the bulk of the tapeworm was picked out from the contents of the bedpan and transferred with forceps to a blackened dish, which proved invaluable because it removed the obvious difficulty of observing the smaller fragments of worm against the white background of the bedpan. Before it is possible to decide whether pretreatment with piperazine is an advantage, further work is required in which the time interval between the administration of piperazine and male fern is reduced.

RADIOLOGY

Clinical and Radiologic Evaluation of Aortic Diameters. L. Dughera and L. Mussa. Minerva med. 48:3697-3702 (Nov. 7) 1957 (In Italian) [Turin, Italy].

The authors made a clinicoradiologic investigation of the usefulness of Real's index as a routine procedure in the evaluation of the degree of dilatation and of elongation of the aortic arch in patients with defects of the aortic arch. Real's index, which utilizes the telecardiogram of the frontal position, is the ratio of the width of the thorax to the sum of the 2 transverse radiuses of the aorta. This ratio is in inverse proportion to the pathological changes in the aortic caliber and in the elongation of the vessel. Grade 1 marks a slightly defective, grade 2 a medium defective, and grade 3 a severely defective dilatation of the aorta. The present study includes 100 patients hospitalized for various diseases, most of whom were between 35 and 75 years of age, whose routine telecardiograms revealed a possible defect in the aortic arch. Real's index graded the alteration of the aortic caliber as severe in 8 patients, medium in 28, slight in 36, and no change in 28. Clinical examination of the patients confirmed this grading, except for 6 patients of the last group who were found to have a cardiac lesion.

The authors conclude that Real's index is a more reliable method than the one of Vaquez and Bordet for general investigation of the correlation between alteration of the aortic diameter and clinical findings of cardiovascular disease. Real's index cannot be a substitute for the more complicated and specific methods of Kreuzfuchs, Abreu, Cabrera-Hernandez, and Faccini, but it is more practical than these for a general evaluation of the aortic diameter in mass roentgenologic examinations.

Hypertension Following X-Irradiation of the Kidneys. C. Wilson, J. M. Ledingham and M. Cohen. Lancet 1:9-16 (Jan. 4) 1958 [London].

The authors describe 2 patients in whom hypertensive renal disease developed after irradiation. A patient had a normal blood pressure when, at the age of 35 years, she received irradiation to the upper abdomen over a wide field, including the kidneys. The time when hypertension developed

is unknown, because she was not observed until symptoms of uremia appeared 8 years later. The interstitial fibrosis, the atrophy of the glomeruli with fibrosis of their capsules, and the changes in the larger arteries indicated a slowly progressive nephrosclerosis. Fibrinoid arterial and arteriolar necroses and glomerular necroses were evidence of terminal acute hypertensive renal damage. In many ways these structural changes resembled malignant nephrosclerosis superimposed on benign nephrosclerosis; nevertheless, in certain respects the picture differed from any other form of Bright's disease. The features characteristic of irradiation nephrosclerosis were the diffuse interstitial fibrosis and the large numbers of fibrohyaline glomeruli, both aggregated in subcapsular fibrotic zones and scattered diffusely through the cortex. Another patient had a normal blood pressure when, at the age of 28 years, he received irradiation to the renal areas. He died of malignant hypertension less than a year later. Histologically, acute arterial and glomerular necroses were the most prominent lesions, a picture closely resembling malignant essential hypertension in its early stages. The interstitial edema could be explained by terminal heart-failure. There was no irradiation sclerosis. The contrasting histological patterns in these 2 patients have indicated the dual nature of irradiation damage to the kidneys in man.

The authors report a series of experimental studies in rats designed to clarify the relation between hypertension and structural changes in the kidney after irradiation. Three types of experiments were carried out on the rats: 1. Both kidneys were exteriorized and irradiated. 2. One kidney was exteriorized and irradiated. 3. Both kidneys were irradiated in situ. These experiments showed that irradiation of the kidneys may produce 2 biological effects: interstitial fibrosis and hypertension, which appear to be independent of one another. Irradiation sclerosis of the kidney is a composite picture of structural damage due to these separate processes. Renal hypertension may develop in the absence of any recognizable structural lesion.

Giant-Cell Tumor of Bone. V. R. Gee and D. G. Pugh. Radiology **70**:33-45 (Jan.) 1958 [Syracuse, N. Y.].

The authors cite the definition of a giant-cell tumor given by Jaffe, Lichtenstein, and Portis. They show the effect of the changing concepts on the experience of the Mayo Clinic, pointing out that some of the lesions originally diagnosed as giant-cell tumor have now been reclassified pathologically as aneurysmal bone cyst, benign chondroblastoma, fibroma, benign giant-cell reparative granuloma, unicameral bone cyst, osteogenic sarcoma, fibrosarcoma, and fibrous dysplasia. A recent report on the clinical and pathological features of the Mayo Clinic's experience was based on 101 cases, the patients being seen from 1905 through December, 1953. Since that report 1 of the lesions included in the series has been reclassified as an aneurysmal bone cyst, and 4 new cases have been added. Thus, a total of 104 lesions meeting current criteria for the pathological diagnosis of giant-cell tumor of bone forms the basis for this study. Emphasis is placed on the roentgenologic aspects. The so-called typical roentgen-ray picture of giant-cell tumor may be summarized as follows: an expanding area of rarefaction situated eccentrically in the end of a long bone of a young adult. Exceptions to this description, however, were common. Expansion was absent or was only questionably present in 23%. The tumor was centrally located within the involved bone in 22%. Nearly 35% of the patients could not be classed as young adults. The most constant element in the above description was the location in the end of the involved bone. A trabeculated appearance was a prominent feature in slightly less than half of the cases. Giant-cell tumors involving flat bones lacked distinguishing radiologic characteristics. Lesions in the pelvic bones were easily obscured and might be difficult to detect. There was a lack of correlation of the initial roentgen-ray picture with the course of the disease after treatment and with the variation in microscopic features.

PUBLIC HEALTH

The Tuberculin Test as a New Approach to the New Era of Tuberculosis Control. K. H. K. Hsu. Dis. Chest **33**:23-37 (Jan.) 1958 [Chicago].

The author reports her experiences with tuberculin testing at the Children's Tuberculosis Hospital and Clinic in Houston, Texas, as a new approach to the control of tuberculosis. Because so few children are tuberculin positive today, a positive reactor stands out as a warning signal, indicating that it is one of the nests from which tuberculosis is being spread and thus pinpointing the spot to which intensive search for tuberculosis should be directed. The advent of isoniazid has made possible the prevention of tuberculous sickness by early drug therapy of primary tuberculosis. This calls for intensive tuberculin testing programs to seek out infected children in order to afford them the protection of modern drug therapy. Family-contact investigation is the most effective method of finding tuberculosis today. It must be carried out with every new case of tuberculosis found, whether it would be in a tuberculous adult or in a tuberculin-positive child. For a thorough and systematic contact investigation, the organized effort of health agencies and the education of the public are essential.

BOOK REVIEWS

New and Nonofficial Drugs: Containing Descriptions of Therapeutic, Prophylactic and Diagnostic Agents Evaluated by the Council on Drugs (Formerly, Council on Pharmacy and Chemistry) of the American Medical Association, 1958. Annual publication issued under direction and supervision of Council. Cloth. $3.35. Pp. 645. J. B. Lippincott Company, 227-231 S. Sixth St., Philadelphia 5; 2083 Guy St., Montreal, Canada, 1958.

This edition continues to reflect, with some improvements, the new program of the Council on Drugs, which embraces the evaluation of scientific data and reports of investigations by competent consultants and the members of the Council. A concise statement of the principles governing the evaluation of the drugs described is given in the preface. The book includes cumulatively all Council monographs on commercially available evaluated drugs that have appeared in THE JOURNAL and have not been included in the book for more than 20 years. The 1958 edition contains 48 new monographs on drugs and, altogether, monographs for more than 600 agents. Trade names are listed at the end of each monograph and in the index as a further aid in prescribing. A generic listing of available preparations and their strengths and sizes is provided with each monograph. Among the more important of the new monographs are those for chlorisondamine chloride, novobiocin, pipenzolate methylbromide, sodium liothyronine, and tolbutamide. Attention is called to the fact that, as new experience and information becomes available, monographs describing previously evaluated drugs are revised in the light of changing knowledge; such revisions are first published in THE JOURNAL when considered of sufficient importance. The volume is annually revised so as to give to the physician the benefit of the Council's latest views concerning newer drugs which he may not have had time to study for himself.

Pharmacology and Therapeutics: A Textbook for Students and Practitioners of Medicine and its Allied Professions. By Arthur Grollman, Ph.D., M.D., F.A.C.P., Professor and Chairman of Department of Experimental Medicine, Southwestern Medical School, University of Texas, Dallas. Third edition. Cloth. $12.50. Pp. 1034, with 192 illustrations. Lea & Febiger, 600 S. Washington Sq., Philadelphia 6, 1958.

This new edition of the author's well-known work retains the general plan of the earlier editions and includes new developments in the field of pharmacology. This basic textbook provides the fundamental principles of pharmacology necessary for the rational and scientific use of drugs. The pharmacology of therapeutically important drugs is emphasized, and special attention is given to mechanisms of action. The first four sections deal with drugs classified according to their site of action, e. g., drugs acting on the central nervous system. Additional sections contain material on chemotherapeutic agents, hormones, vitamins, water, and various inorganic compounds. The end of each chapter is devoted to data on all official British and American preparations, with a description of their properties, dosage, and mode of administration. There are appendixes on prescription writing and a classification of drugs according to their therapeutic uses. The author's style is lucid and concise, and key words have been put in boldface type to facilitate reference. This textbook is equally suited for students and practitioners in medicine and the allied health professions who wish to keep abreast of pharmacological developments.

Preventive and Corrective Physical Education. By George T. Stafford, Professor of Physical Education, University of Illinois, Urbana, and Ellen Davis Kelly, Professor and Head, Department of Health and Physical Education for Women, Illinois State Normal University, Normal. Third edition. Cloth. $5. Pp. 395, with 57 illustrations. Ronald Press Company, 15 E. 26th St., New York 10, 1958.

This new edition of a well-known book deals with physical education for the handicapped and for those with special health problems, preventive exercises, and adaptation of regular class work to meet the needs of children with transient or persistent physical handicaps. The volume is intended for use in orienting undergraduate and graduate physical education students in the corrective and adaptive phases of their work. Every school has its share of pupils with special physical problems. When modified physical education is available, this program can be helpful, in many instances, in rehabilitating pupils with remediable problems. It can also assist in helping those with irremediable problems to learn to live effectively with their handicaps. It is emphasized that in both situations the nature and extent of activity must be medically determined. In this framework, the authors visualize the physical educator as the skilled technician carrying out the exercise prescription.

For purposes of discussion, preventive physical education is defined as the provision of appropriately designed exercise to substitute for the natural, spontaneous, everyday opportunities for vigorous physical activity that were formerly available. Corrective physical education is the scientific use of specific bodily movements to restore normal strength and function to selected body parts.

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

Adapted physical education involves the modification of sports, dance, gymnastics, and other activities in terms of the needs of persons with special activity restrictions. The school with a well-organized physical education program offers all of these modifications, as well as the regular program for normal children. The first section of the book advances reasons why optimal fitness is as important for the handicapped as for the normal person. The role of exercise in rehabilitation is then outlined, and the physical educator's responsibility for the application of preventive and corrective types in the school setting is delineated. The discussion of biological foundations and body mechanics which follows constitutes a review of the physiology of exercise with particular attention to posture. The greatest portion of the volume, however, is devoted to exercise suggestions, for specific conditions, which may be carried out under medical direction. A section on the organization of the program covers details of record keeping, scheduling of classes, and administration of exercise. The volume is well organized, clearly written, and admirably illustrated. Understanding of the concepts presented should help the physical educator to work cooperatively with the physician in the provision of preventive and corrective physical education for children who may profit from such programs.

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Comparative Aspects of Haemolytic Disease of the Newborn. By C. Fulton Roberts, M.A., M.D. Cloth. $3; 17s. 6d. Pp. 199. [Grune & Stratton, Inc., 381 Fourth Ave., New York 16]; William Heinemann, Medical Books, Ltd., 99 Great Russell St., London, W. C. 1, England, 1957.

This is a worthy companion of "The Rhesus Factor," written by the same author in 1947. The four most attractive features of the monograph are (1) the vertical treatment of the subject (the historical approach to the topic as a whole and to each separate phase of it); (2) the horizontal treatment (the comparative review of the disease phenomenon in animals); (3) the admirable selectivity, which made it possible to present a wealth of material in a pocket-sized book; and (4) the combination of brevity with clarity which makes reading enjoyable and profitable. The history of jaundice in the newborn infant and its association with hydrops is traced to the beginning of the 17th century. Equally fascinating is the review of the history of kernicterus. It is sobering to read that some concepts of pathogenesis which seemed new when introduced in the past 10 years had been suggested in a volume published in 1679. The disease occurs naturally in the horse and mule and was described in the mule foal as early as 1774. It was produced experimentally in mules, pigs, guinea pigs, rats, dogs, and rabbits. The author also discusses important aspects of nomenclature, avoiding the pitfall of the two competing systems of terminology. An appendix is devoted to a judiciously selected bibliography, and there is a well-organized index. This book is highly recommended to all who are interested in hemolytic disease of the newborn infant.

Cardio-Charting: Universal Method of Recording Heart Auscultation. By Arthur Briskier, M.D., Senior Clinical Assistant Physician and Cardiologist, Mount Sinai Hospital, New York City. Cloth. $6. Pp. 58, with 15 illustrations. The Macmillan Company, 60 Fifth Ave., New York 11; Brett-Macmillan, Ltd., 25 Hollinger Rd., Toronto 16, Canada, 1957.

Diagrammatic representation of heart sounds and murmurs is not a new idea, but this is the first real attempt to standardize records so that any physician, regardless of language barriers, will understand immediately what is recorded. Blue is used for heart sounds and red for murmurs. Although the author has made the symbols as simple as possible, still a code is necessary to decipher some of the charts. The picture does not speak for itself. Once having mastered the code, a complete description of heart sounds and murmurs can be recorded rapidly in a small space. Some of the examples chosen by the author are unfortunate. For instance, figure 11 records auscultatory findings in a patient each year for a 10-year period. It is hard to believe that this patient in 1947 had no murmurs, in 1950 had such marked mitral stenosis as to require cardiac surgery, in 1951 had no murmurs, and in 1953 had the murmurs of mitral stenosis and insufficiency and aortic stenosis. It will probably take a long time for the author's methods to be universally adopted. In the meantime, the individual physician will find the technique of charting described in the book useful for his own records.

A Textbook of Clinical Neurology, with an Introduction to the History of Neurology. By Israel S. Wechsler, M.D., Consulting Neurologist, Mount Sinai Hospital, New York. Eighth edition. Cloth. $11. Pp. 782, with 179 illustrations. W. B. Saunders Company, 218 W. Washington Sq., Philadelphia 5; 7 Grape St., Shaftesbury Ave., London, W. C. 2, England, 1958.

It is 31 years since the first edition of this textbook reached the American medical profession. Most, if not all, of the younger and middle-aged neurologists now writing were weaned in the neurological sciences on the earlier editions. Throughout the years this book has maintained a high standard. The writing is clear and lucid; the illustrations are well done; and the material is treated with the care that one would expect from a scholarly physician. In this edition the format has been changed slightly and the paper is not quite as glossy as that formerly used, thus making for a better reproduction of the photographs and for a greater ease in reading. The illustrations are essentially the same as in previous editions, except for an added illustration of electroencephalographic changes in epilepsy. Some additional references have been added. The author has, for several editions, included as a final chapter the introduction to the history of neurology. This plays a distinct role in bringing to young neurologists the great traditions of their field.

QUESTIONS AND ANSWERS

SAFE PARTICIPATION IN SPORTS

To the Editor:—*The incidence of cerebrovascular accidents and other pathological conditions caused by atherosclerosis increases with the age of the patient. Such conditions are often associated with excessive physical or nervous tension. At about what age must physical overactivity, especially certain sports such as gymnastics, be considered as potentially dangerous and therefore restricted?*

Julian Movchan, M.D., Oakwood, Ohio.

Answer.—It is true that the incidence of vascular accidents due to atherosclerosis increases with age. How much physical activity a person ought or should be encouraged to undertake must be an individualized decision. Many factors should enter into such a prescription—such things as to what degree the patient has been sedentary or physically active all his life and whether there are symptoms or signs of organic involvement from atherosclerosis, hypertension, or any other disease. No categorical answer to this question can be given. Activity that might be contraindicated after careful medical evaluation for a person aged 40 might be permitted to a man of 60 years.

LIQUID NITROGEN FOR WARTS

To the Editor:—*What is the technique of using liquid nitrogen in the removal of plantar warts?*

Preston L. Hathcock, M.D., Fayetteville, Ark.

Answer.—The keratotic portion of the wart is pared off before treatment is begun. The liquid nitrogen is applied from a small metal container with a cotton swab. The procedure must be fast, since the liquid nitrogen evaporates rapidly. Application is made without pressure for several seconds to one minute, depending on the size and depth of the wart. There is a momentary stinging and burning sensation immediately after the contact with the chemical, and the discomfort continues in varying degrees during the first 24 hours after treatment. No dressing is necessary at this stage. In large lesions the pain may be severe. Within 72 to 96 hours, vesiculation appears which may be hemorrhagic. The entire area turns a dark brown color and later crusts. In severe reactions there is undermining at the treated site with serous or hemorrhagic exudate, in which case the sloughed out material is removed and a petrolatum dressing applied. Healing occurs with a flat scar in one to two weeks, depending on the size of the treated site. Liquid nitrogen is generally not used in the treatment of plantar warts, except where the growth is small or superficial. Its best effect is in the treatment of verruca vulgaris and hemangiomas. The only advantage of liquid nitrogen over solid carbon dioxide is that no pressure is required and a much shorter period of surface application is necessary. This is because the liquid nitrogen is about three times as cold as solid carbon dioxide. The melting point of liquid nitrogen is −209.8 C, while that of dry ice is only −78.5 C. Liquid nitrogen is expensive, is hard to obtain, evaporates quickly, and is only practical where a dermatologist may be using it on a large number of patients in one day. On the other hand, dry ice is obtainable at any ice cream parlor or can be made in a few seconds with the Kidde apparatus, and it is just as efficacious.

RETINAL LIGHT TOLERANCE

To the Editor:—*What is the brightest light the retina can tolerate? Please make a distinction between visible and infrared.* *M.D., Illinois.*

Answer.—According to a 1954 report prepared for the Air Force by Baker and Grether, the upper limit of visual tolerance for brightness for "white light" is 16,000 millilamberts. A lambert is defined as a unit of brightness equal to the brightness of a perfectly diffusing and reflecting surface illuminated by one centimeter-candle, i. e., emitting one lumen per square centimeter. At this brightness level (16,000 millilamberts) the tearing, pain, and general discomfort become too great to be tolerated. It must be remembered that not only is the retina involved in this discomfort but the entire pupillary mechanism as well. Should the subject, either human or animal, be anesthetized, a higher level might be used before thermic damage to the retina results, but even here, according to Verhoeff and Bell, no artificial illuminant, in practical use, can fairly be considered dangerous from the standpoint of thermic action on the retina. This means that it would be necessary to have as an artificial light source something other than those in standard use.

Under certain circumstances, there may be eyes that could not tolerate a brightness of 16,000 millilamberts. Their level would be much lower. The circumstances are the general environment in which the subject is at the time the bright light is

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

introduced, the rapidity with which the bright light is introduced, the direction from which the bright light comes, the general physical condition of the subject's eyes, the subject's age, the fatigue of the subject's eyes, his pupillary response, and other factors that are difficult to assess.

References

Baker, C. A., and Grether, W. F.: Visual Presentation of Information, Project 7180, Wright Air Development Center, Air Research and Development Command, Wright-Patterson Air Force Base, Ohio, United State Air Force, Aug., 1954, pp. 69-75.

Verhoeff, F. H., and Bell, L.: Pathological Effects of Radiant Energy on Eye: Experimental Investigation, Proc. Am. Acad. Arts & Sc. **51**:630-759 (July) 1916.

Duke-Elder, W. S.: Textbook of Ophthalmology, London, Henry Kimpton, 1932, pp. 903-929.

CHYLURIA

To the Editor:—*A 27-year-old man has suffered from recurrent chyluria for about one year. Microfilariae were found repeatedly in the peripheral blood in the early stage of the disease. There was no enlargement of the extremities, testes, or lymphatics. The patient is afebrile. He was given 300 mg. of diethylcarbamazine daily for four months, and blood testing for microfilariae became negative. At present, chyluria is still intermittently present. Recently, the patient has become easily tired and worries about his condition. Should the use of diethylcarbamazine be continued in the absence of microfilariae in the blood? Is there any way to rid the patient of chyluria permanently? Is diethylcarbamazine more effective in killing filaria than antimony?*

Wang Sheng Chhuang, M.D., Formosa, China.

Answer.—It is possible for adult parasites to be primarily limited to the deep preaortic lymph nodes, through which pass the lymph vessels from the small intestine, pelvis of the kidney, and lumbar lymph nodes. Obstruction will lead to reflux of chyle into these plexuses. If excessive back pressure causes rupture, chyle may flow into the bladder, as seems to be the case in the patient described. Since this process involves the deep lymphatics and because the adult parasites (rather than the microfilariae) are pathogenic, the absence of microfilariae from peripheral blood has little direct bearing on the situation, except to suggest that continued use of diethylcarbamazine will serve no useful purpose. Napier stated that tryparsamide, given in doses of 2 to 3 Gm. intravenously, appeared to control the symptoms in chyluria. He added that when cystoscopy shows that the leakage is in the bladder and is very limited, fulguration has been used, but its application is also very limited. Diethylcarbamazine is primarily effective in two ways: It controls filarial fever, and it decreases the number of circulating microfilariae. Antimony compounds are of no value (Queries and Minor Notes, *J. A. M. A.* **165**:1220 [Nov. 2] 1957).

REACTION TO ALCOHOL AND CHLORAL HYDRATE

To the Editor:—*A patient, who has been given 1 or 2 Gm. of chloral hydrate for sleeping at night, who is intelligent and a good observer, and who weighs 200 lb. (90.7 kg.), states that if he drinks any alcohol up to three days after last taking the choral hydrate his face (and face only) becomes so violently red that it is cosmetically unbearable and embarrassing. He claims to have been thus cured of mild alcoholism, and he now takes the chloral hydrate if he feels tempted to drink. He has no known diseases, but he also complains of occasional numbness in both heels. How is this effect of chloral hydrate explained?*

A. H. Chapman, M.D., Kansas City, Mo.

Answer.—This patient in all probability has an idiosyncrasy to the chloral hydrate and alcohol combination, since this response is not characteristic of either drug when taken in ordinary amounts. Although both drugs will effect a peripheral vasodilation, this response to alcohol coming on at a time after taking chloral hydrate when the latter should have been detoxified or oxidized suggests the possibility that the oxidation of the alcohol has been stopped at the aldehyde stage. The reaction is suggestive of that which obtains after disulfiran has been taken in the treatment of alcoholism. The possibility that the response is due to the chloral hydrate and triggered by the alcohol is rather remote. While it is true that chloral hydrate is a hydrated aldehyde, ordinarily it is readily oxidized to trichlorethanol. The history indicates "no known disease," but it is suggested that some liver or kidney disturbance exists which inhibits the proper oxidation of these substances.

CONTROL OF BLEEDING

To the Editor:—*In an article by Marshall* (Mississippi Valley M. J **79**:202, *1957*), *the following statement is made: "Stress is placed upon treating microcirculatory dilatation specifically with the use of the only presently known microcirculatory constrictor, Kutapressin." Please state the scientific evidence of such a belief.*

Lewis A. Klein, M.D., Washington, D. C.

Answer.—Articles dealing with clinical observations in the use of Kutapressin (vasoconstricting principle of liver extract in a sterile aqueous solution) in the control of bleeding seen with tonsillectomies and dental extractions are available. Each author has stated that the control of bleeding was brought about by vasoconstriction caused by the drug. In no instance has laboratory support regarding this action been cited or reported. Moreover, these benefits, if they occur, evidently are not due to changes in bleeding or clotting mechanisms, according to one group of investigators. It is difficult

to accept the clinical improvement reported by one author in patients with peripheral vascular diseases if the medicament's action is that of a microcirculatory constrictor. Contrary to the good reports available on its use in dermatology, clinical vasoconstriction of visible blood vessels characteristic of rosacea and allied conditions has not been demonstrated, although Marshall (*Wisconsin M. J.* **49**:369, 1950) reported measurable skin heat changes with a thermopile after injections of Kutapressin.

WOUND DISRUPTION

To the Editor:—*On the second postoperative day, because of severe allergic reaction, 40 units of ACTH was administered to a patient, and in another instance 5 mg. of prednisolone was given four times daily for two days. Is such treatment likely to result in wound disruption?*

M.D., New York.

Answer.—Although ACTH and glucocorticoids do tend to inhibit wound healing when given in large doses to experimental animals, the amounts stated in the question are unlikely to produce wound disruption in man.

ESTROGENS FOR MEN

To the Editor:—*Is there any estrogen that can be safely given to men without the risk of producing gynecomastia? Estrogenic substances combined with testosterone have been tried, but they too gave rise to pain in the breast.*

M.D., New Jersey.

Answer.—No known estrogen can be given to men without eventually producing gynecomastia.

STRESS INCONTINENCE IN A MAN

To the Editor:—*A total transurethral resection was performed on a 78-year-old man in January, 1957, for a prostatic condition. He had carcinoma, grade I-2. Since then he has taken 2.5 mg. of conjugated estrogens twice daily. His bladder capacity is normal, he has no stricture, and his prostate appears to be smooth and normal by rectal digital and cystoscopic examination; however, he has intractable stress incontinence when on his feet. What results can be expected from operative attachment of the bladder to the abdominal wall? Would results from any other treatment be better?*

M.D., West Virginia.

Answer.—Transurethral prostatic resection, whether performed for benign prostatic hyperplasia or for carcinoma, occasionally may result in urinary incontinence of varying degrees. This leakage often results from weakening of the external sphincter of striated muscle, which extends into the apex of the prostatic capsule for about 7 mm., according to Beneventi and Marshall (*J. Urol.* **75**:273, 1956). Surgical correction of this type of incontinence has not been rewarding. Attaching the bladder to the symphysis pubis or abdominal wall is more successful in women. Hayes has reported an excellent result in a patient with the type of disease described in whom the levator ani muscles were brought together in the midline through a perineal incision and sutured to the bulb of the urethra (*South. M. J.* **48**:234, 1955). Foley made a cutaneous tunnel around the deep urethra through which he placed a circular pneumatic bulb controlled by a tube leading to the patient's trousers' pocket (*J. Urol.* **58**:250, 1947). The patient passed his urine by pocket control. Most patients wear a rubber urinal or use a Cunningham incontinence clamp. An inlying Foley catheter bag draining into a disposable leg bag of plastic might tide the patient over some temporarily difficult situation, such as a motor trip.

DROWSINESS WITH OXYGEN THERAPY

To the Editor:—*A patient with lung disease, when oxygen is administered, becomes drowsy and his respiration decreases. Does positive pressure breathing decrease the blood carbon dioxide concentration? If so, by what mechanism does this occur? It is advised to give oxygen to such patients at a flow rate of 2 or 3 liters per minute. Acetazolamide can reduce the blood carbon dioxide concentration in emphysema, but this would require days. If the patient needs oxygen and has pneumonia in addition to emphysema, is positive pressure breathing still indicated?*

M.D., West Virginia.

Answer.—It is assumed that the patient has emphysema with carbon dioxide narcosis. Continuous positive pressure breathing with oxygen in such a patient may cause hypoventilation and would be harmful. Intermittent positive pressure breathing, however, with the addition of a bronchodilator, such as isoproterenol hydrochloride, may decrease the arterial pCO_2 by increasing the alveolar ventilation. The rate of oxygen administration should be started at 1 liter per minute and gradually increased. A simple nasal catheter may be sufficient. Acetazolamide should be tried for maintenance therapy rather than for the treatment of the acute narcosis. The patient with pneumonia and emphysema who needs oxygen should be given either the intermittent positive pressure type of administration or oxygen at the reduced flow rate. A Drinker respirator would be the most effective type. When difficulties arise with the administration of oxygen, the respirator may be a lifesaver. When large amounts of secretions are present in the tracheobronchial tree, vigorous methods of aspiration, such as the use of a tracheal catheter, are in order. At times, even a tracheotomy may be necessary.